Michigan Potash Operating, LLC

MICHIGAN POTASH OPERATING, LLC

Sodium and Potassium

CLASS III UNDERGROUND INJECTION

OSCEOLA AND MECOSTA COUNTY, MICHIGAN

THE UNITED STATES POTASH PROJECT
APRIL 2015

Sleeping Bear Dunes, Leelanau County, Michigan, Source, EPA, Region 5

CLASS III, TYPE G
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The U.S. Potash Project

OMB No. 2040-0042 Approval Expires 11/30/2014

United States Environmental Protection Agency

Underground Injection Control Permit Application

(Collected under the authority of the Safe Drinking Water Act. Sections 1421, 1422, 40 CFR 144)

I. EPA ID Number		T/A	C
U			

Read Attached Instructions Before Starting

For Official Use Only

Application approved mo day year	Date received mo day year	Permit Number	Well ID	FINDS Number

II. Owner Name and Address

Owner Name: Michigan Potash Operating, LLC

Street Address: 1225 17th Street, Suite 2200, c/o Fox Rothschild

Phone Number: (231) 577-9616

City: Denver

State: CO

ZIP CODE: 80202

III. Operator Name and Address

Owner Name: Michigan Potash Operating, LLC

Street Address: 1225 17th Street, Suite 2200, c/o Fox Rothschild

Phone Number: (231) 577-9616

City: Denver

State: CO

ZIP CODE: 80202

IV. Commercial Facility

- [ ] Yes
- [x] No

V. Ownership

- [x] Private
- [ ] Federal
- [ ] Other

VI. Legal Contact

- [ ] Owner
- [x] Operator

VII. SIC Codes

1479

VIII. Well Status *(Mark "x")*

- [ ] A. Operating — Date Started mo day year:
- [ ] B. Modification/Conversion
- [x] C. Proposed

IX. Type of Permit Requested *(Mark "x" and specify if required)*

- [ ] A. Individual
- [x] B. Area

Number of Existing Wells	Number of Proposed Wells	Name(s) of field(s) or project(s)
0	4	US POTASH PROJECT

X. Class and Type of Well *(see reverse)*

A. Class(es) (enter code(s))	B. Type(s) (enter code(s))	C. If class is "other" or type is code 'x,' explain	D. Number of wells per type (if area permit)
III	G		

XI. Location of Well(s) or Approximate Center of Field or Project

Latitude Deg	Min	Sec	Longitude Deg	Min	Sec	Township and Range Sec	Twp	Range	1/4 Sec	Feet From	Line	Feet From	Line
43	49	43.3	85	19	29.1	31	17N	8W	NW	0	N	0	W

XII. Indian Lands (Mark 'x')

- [ ] Yes
- [x] No

XIII. Attachments

(Complete the following questions on a separate sheet(s) and number accordingly; see instructions)

For Classes I, II, III, (and other classes) complete and submit on a separate sheet(s) Attachments A--U (pp 2-6) as appropriate. Attach maps where required. List attachments by letter which are applicable and are included with your application.

XIV. Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibliity of fine and imprisonment. (Ref. 40 CFR 144.32)

A. Name and Title *(Type or Print)*	B. Phone No. *(Area Code and No.)*
Theodore A. Pagano, General Manager	(231) 577-9616
C. Signature	D. Date Signed
	01/13/2015

US EPA CHECKLIST CROSS REFERENCE

MICHIGAN/INDIANA
PERMIT APPLICATION CHECKLIST FOR CLASS I INJECTION WELLS (AS APPLIED TO CLASS III WHERE APPLICABLE)
And Specific checklist items specific to Class III wells, as added (IN BLUE)
(Keyed to subsections of the Underground Injection Control permit application form)

ATTACHMENT.SECTION	USEPA CHECK	
		A. AREA OF REVIEW
A.1	_____	___The area of review ("AOR") radius for a Class III Area permit was established by USEPA Region 5 guidance as to be ¼ mile beyond the boundary of the proposed Class III Area.
F.2	_____	___Depth of top of proposed injection interval
H.2	_____	__ Known or estimated pre-injection pressure at top of injection interval
I.3	_____	__ Known or estimated specific gravity of formation fluid at top of injection interval
D.3	_____	__ Depth of bottom of lowermost aquifer which qualifies as an Underground Source of Drinking Water (USDW)
D.3	_____	__ Hydrostatic head (or static water level) of lowermost USDW
H.2	_____	__ Expected or modeled maximum pressure buildup in the injection interval
		B. MAPS OF WELLS/AREA OF REVIEW
Figure A2	_____	Topographic map of AOR or area extending at least 1 mile beyond property boundaries, whichever is greater, showing the following: (Only items of public record are required.)
B.1	_____	__ Each major intake and discharge structures for liquid waste
B.2	_____	__ Each hazardous waste treatment, storage, or disposal facility
C.1	_____	__ Number, name and location of all producing wells
C.2 & C.3	_____	__ Number, name and location of all injection wells of all classes
C.4	_____	__ Number, name and location of all abandoned wells, plugged wells, and dry holes
Attachment B & F	_____	__ Known or suspected faults
C.5	_____	__ Location of all water wells of public record or otherwise known to the applicant, within the AOR or within a quarter mile of the facility property boundary, whichever is greater
Figure B5	_____	__ Bodies of water, springs, surface and subsurface mines and quarries, residences, and roads within the AOR, or within a quarter mile of the facility property boundary, whichever is greater
		The following information is also required:
C.7	_____	__ List of names and addresses of all owners of record of land within a quarter mile of the facility boundary, unless waived by the Director.
C.8	_____	__ A description of the methods used to locate wells in the AOR.
		C. CORRECTIVE ACTION PLAN AND WELL DATA
C.6	_____	__ Corrective action plan for inadequately plugged wells in the AOR which penetrate the top of the confining zone
		The following information should be submitted for all wells in the AOR which penetrate the top of the confining zone:
C.1 & C.2 & C.3 & C.4	_____	__ Well construction, date of construction and total depth
C.1 & C.2 & C.3 & C.4	_____	__ Well operator/owner
APPENDIX 1	_____	__ Cement records
APPENDIX 1	_____	__ Plugging records
Figure B1-B8	_____	__ Distance from proposed injection well
		D. MAPS AND CROSS SECTIONS OF USDWs
Figure D1	_____	__ Stratigraphic column of site which indicates all USDWs
Figure D2	_____	__ Data substantiating the depth of the lowermost USDW, if available
		E. DOES NOT APPLY TO CLASS III WELLS
		F. MAPS AND CROSS SECTIONS OF GEOLOGIC STRUCTURE OF AREA
Figure F3, F6-F10	_____	__ Cross sections and structure contour maps adequate to describe the regional geology of the

		area, including especially any faults
Figure F6-F10	_____	__ Cross sections of site-specific geology, including any faulting in the AOR
F.2 & Figure F5	_____	__ Geologic description of confining zone (including lateral extent, lithologies, thicknesses, permeabilities, porosities, extent of natural or induced fractures, etc.)
F.2 & Figure F4-F15	_____	__ Geologic description of injection zone (including depth, lateral extent, lithology, thickness, permeability, porosity, presence of natural or induced fractures, etc.)
Figure F16, Figure F18	_____	__ Page-sized (8 1/2" x 11") diagram showing well construction and corresponding site stratigraphy
		G. DOES NOT APPLY TO CLASS III WELLS
		H. OPERATING DATA
H.1	_____	__ Estimated average and maximum injection rate and volume
H.2	_____	__ Estimated average and maximum injection pressures
H.4	_____	__ Source(s) of waste (brief description of industrial process(es) which produce the waste)
H.4	_____	__ A representative waste analysis (including all major constituents and, for hazardous wastes,
H.5	_____	all hazardous constituents and characteristics)
H.6	_____	__ Plans for corrosion monitoring, if the waste is corrosive
		I. FORMATION TESTING PROGRAM
I.1	_____	__ Procedures to verify depth of lowermost USDW, if needed
I.2	_____	__ Procedures to obtain extrapolated formation pressure in porous and permeable zones within approximately 500 feet of the top of the injection zone (non-hazardous wells) or injection interval (hazardous wells)
I.3	_____	__ Sampling and analysis procedures for formation fluid of 1. the first aquifer overlying confining zone (hazardous and non-hazardous waste wells), 2. the injection zone (non-hazardous waste wells) or injection interval (hazardous waste wells), and 3. the containment interval (hazardous waste wells only)
I.4 & FIGURE F5	_____	__ Cores and laboratory core testing for confining and injection zones (For non-hazardous waste wells, a minimum of one 30-foot core of the confining zone and one 30-foot core of the injection zone are required. For hazardous waste wells where injection of restricted wastes is proposed, one or more cores of the containment interval will also be necessary)
I.5	_____	__ Determination of fracture closure pressure of injection zone (nonhazardous wells) or injection interval (hazardous wells)
I.6	_____	__ Injectivity/fall-off testing of injection zone/interval, including interference testing if multiple wells are proposed
ATTACHEMENT J.	_____	**J. STIMULATION PROGRAM**
		Class I wells are not recommended in areas where fracture stimulation will be necessary. If it is proposed, procedures should be included in the permit application which show how the operator proposes to confine fractures to the injection formation. If acid or other type of stimulation is proposed, procedures should also be included in the permit application under this section.
		K. INJECTION PROCEDURES
Figure K1	_____	__ Plant plan showing flow line of waste stream(s) to be injected
K.3	_____	__ Description of filters, storage tanks (including capacity), and any pretreatment processes and facilities, including location on plant plan
K.4	_____	__ Description of injection pumps, including rate capacity
K.5	_____	__ Description of annulus pressure maintenance system
K.6	_____	__ Description of alarm and shut-off system
		L. CONSTRUCTION PROCEDURES
L.1	_____	__ Detailed well construction procedures
L.2	_____	__ Estimated time table for drilling, logging and formation testing
L.1 & L.3	_____	__ Proposed open-hole and cased hole logs

L.4	_____	__ Proposed mechanical integrity testing (cement bond logs, radioactive tracer log, and temperature, noise or oxygen activation log are required prior to injection of waste)
L.5	_____	__ Proposed buffer fluid and volume, if any
l.6	_____	__ CFR 40 146.32 Check List Items
		M. CONSTRUCTION DETAILS
		The following information should be included in well schematics and/or tables:
M.1	_____	__ Proposed construction of well, including total depth, completion type, casing sizes, types, weights, and setting depths
M.2	_____	__ Proposed cement type and amount for all casing (All casings should be cemented to surface.)
M.3	_____	__ Tubing and packer specifications, including size, type, and setting depths
M.4, Figure M1-M2		__ Well head construction details
M.5	_____	__ Location of sample tap and female coupling for independent determination of annulus pressure
	_____	**N. CHANGES IN INJECTION FLUIDS (specific to Class III)**
N.1	_____	Expected Changes in Pressure
N.2	_____	Native Fluid Displacement
N.3	_____	Direction of Movement of Injection Fluid
ATTACHEMENT O		**O. PLANS FOR WELL FAILURES**
		The applicant should submit contingency plans for 1. actions that will be taken if mechanical integrity of well is lost and 2. storage or alternate treatment or disposal of waste in the case of emergency shut-in.
		P. MONITORING PROGRAM
P.1	_____	__ Waste Analysis Plan (see guidelines)
P.2	_____	__ Description of monitoring and recording system for injection pressure, rate, and volume, and for annulus pressure
P.3	_____	__ Description of sight glass level monitoring and recording, if a seal pot system of annulus pressure maintenance is proposed
P.4, APPENDIX 2	_____	__ Groundwater monitoring plan and Quality Assurance Project Plan (In most cases, this will be necessary for new wells injecting restricted hazardous wastes. Region 5's two guidance on groundwater monitoring should be followed.)
		Q. PLUGGING AND ABANDONMENT PLAN
Q.1-Q.2	_____	__ Signed plugging and abandonment form, showing amount and type of cement, placement method, and estimated cost. (Region 5 requires a cement plug to extend from the base of the lowermost casing to the surface.)
Q.2	_____	__ Signed estimate of plugging and abandonment costs (and post-closure costs, if applicable) by an independent firm
Q.3	_____	__ Closure plan, including plans to acquire a representative fluid sample from the first aquifer overlying the injection zone (Only necessary for wells which inject restricted hazardous wastes)
Q.4	_____	__ Post-closure plan, which covers the requirements of 40 CFR 146.72 (Only necessary for hazardous waste wells)

		R. NECESSARY RESOURCES
ATTACHEMENT R	_____	__ Signed mechanism of financial assurance sufficient to cover closure (and post-closure, if applicable) of well.
		S. AQUIFER EXEMPTIONS
N/A		If application is made, 40 CFR 146.4 may be used as a guideline.
		T. EXISTING EPA PERMITS
T.1	_____	Briefly describe activities which require the applicant to obtain permits under the RCRA, UIC, NPDES, or PSD programs. List all permits or construction approvals received or applied for at the facility where the well will be located, under any of the following programs:
T.1	_____	1. Hazardous Waste Management under RCRA
T.1	_____	2. UIC program under SDWA
T.1	_____	3. NPDES program under CWA
T.1	_____	4. Prevention of Significant Deterioration (PSD) program under the Clear Air Act
T.1	_____	5. Nonattainment program under the Clean Air Act
T.1	_____	6. Dredge and fill permits under section 404 of CWA
T.1	_____	7. Other relevant environmental permits, including State permits.
ATTACHEMENT U		**U. DESCRIPTION OF BUSINESS**
	_____	__Briefly describe the nature of the business and list up to four SIC codes which best reflect the principal products or services provided by the facility.
		PRIOR RELEASES
N/A	_____	__ For existing wells, list the highest injection pressure in use in this well since construction and the approximate dates of injection near that pressure
N/A	_____	__ List of prior releases of waste through injection wells at this facility to intervals other than that proposed in this permit application
		IF THE PERMIT APPLICATION IS FOR HAZARDOUS WASTE INJECTION, THE APPLICANT MUST ALSO INCLUDE THE FOLLOWING:
N/A	_____	__ All applicable RCRA waste codes for listed and characteristic wastes proposed for injection in this well
N/A	_____	__ All applicable Land Disposal Restriction deadlines or "ban dates"
N/A	_____	__ Proposed schedule for submittal of exemption petition, if waste is restricted from land disposal
N/A	_____	__ Additional testing proposed to support the exemption petition
N/A	_____	__ Future plans for waste minimization and a certified statement which meets the requirements of 40 CFR 146.70(d)

INTRODUCTION

I. NEED FOR PROPOSED ACTION

Potassium is one of the three primary nutrients essential to support carbohydrate production and plant life. Potassium is supplied in natural fertilizers to improve productivity, efficiency, and yields of agribusiness.

The major source of potassium is potash (potassium chloride), extracted form sylvinite, a naturally occurring mineral containing both potassium chloride (potash) and sodium chloride (table salt). Since 1965, world consumption of potash grew from 12 million tons, to an approximate 58 million tons today. In 50 years, potash consumption has almost quadrupled. In the last two decades, potash consumption has doubled.

The American farmer, the most efficient in the world, consumes about six million tons of potash annually and globally, pays more than any other farmer. Over 86% of U.S. potash consumption is imported. Domestic potash supply comes principally from the Designated Potash Area in New Mexico; established in 1939 as a strategic resource, it has been and remains protected by the Secretary of the Interior. Over the past 80 years, the Designated Potash Area has become critically depleted. In December of 2014, one of the two potash producers based in the United States will cease potash production from the Designated Potash Area, citing depletion and low ore grade.

Despite being required for food growth, potash is the world's tightest controlled commodity. It is utilized throughout the globe, but commercial production occurs in only 13 countries and from 13 companies.

The American farmer, the most efficient in the world, consumes about nine million tonnes of potash annually, but over 86% is imported, making the potassium fertilizer the farmer's highest cost to produce our food. Known domestic potash deposits are nearing depletion, and within the next twenty years, US potash production will have declined an additional 34%, and import reliance will have increased to over 90%.

The State of Michigan controls *one of three* domestic supplies for potash. Michigan potash was discovered in 1980, making it the youngest global commercial deposit of sylvinite.

Michigan has the only proven and probable, commercial, potash available and ready for development.

Fertilizer is the American farmer's greatest cost of production. Further increase in U.S. imports and tighter control of potash could lead to a distressed us farmer, less staple crop growth, exports, loss of jobs, revenues, and taxes, which in turn could lead to future shortages, price instability, and significantly higher costs and food costs.

Michigan's potash is critically important to the American farmer, who provides our food.

- The State of Michigan, as a contributive part of the U.S. soybean and corn belt, resides within the greatest potash demand region in all of North America.
- The State of Michigan contains the world's purest and highest grade potash and it resides in the U.S. corn belt, closest to the U.S. farmer.
- Discovered in 1980, and successfully produced since 1989, this concentrated area is only *one of three* potash producing regions in the United States. The other two have been critically depleted, leaving one remaining muriate of potash producer in the United States.
- The known, delineated, deposit in Michigan has the capability to double domestic potash production for over a century.

The proposed action will:

- Create a competitive potassium fertilizer price for the US farmer, which helps the noblest of professions. Helping our farmer, means supporting their choice to 'keep the farm' and grow food for us.
- Provide domestic production of a material critical to the US farmer, the nation's agricultural health, and the nation's food security.
- Reduce the need for import and improve the nation's balance of trade.
- Reduce transportation costs to key agricultural areas throughout the US.
- Create a new and sizable opportunity in Rural Western Michigan, providing jobs directly and indirectly to an area with a great need.

II. ALTERNATIVES TO THE PROPOSED ACTION

There are no commercial alternatives for potash.

III. THE PROPOSED ACTION

The proposed action is the perpetuation of pre-established potash production from Hersey Michigan, where production has occurred since 1989.

Michigan potash deposits occur at great depths, over 7,600' below ground level. Therefore, deep, directionally drilled wells are utilized to access the deposit. This creates a favorable means of potash and salt extraction, which impacts less than 3.5% of the surface. In other words, there is minimal to no surface disturbance, substantially reducing environmental impact and risk.

In the state of Michigan, there are three active Class III area permits, all for the purpose of extracting sodium chloride; just as proposed by MPC, one of which immediately borders the proposed Class III permit.

The drilling and operation of Class III wellbores, in the state of Michigan are currently subject to approval and permitting processes governed separately by the U.S. Environmental Protection Agency (EPA) and the Michigan Department of Natural Resources (DNR).

The EPA's Underground Injection Control Permit Application, calls for the submittal of comprehensive project supporting data in the form of a series of attachments designated A through U; attached hereto and respectfully submitted for review.

Michigan Potash Operating proposes to develop the proposed Class III Area Permit; initially with 8 directionally drilled wellbores, all from a single location measuring 430' by 250', or less than two and a half acres (2.5 Acres), and thereafter, as is needed from time to time, from centrally located drilling pads of similar design. Albeit, this location has the capability, as sized, to serve as the basis for a substantially greater number of wells, as needed to access the Class III area.

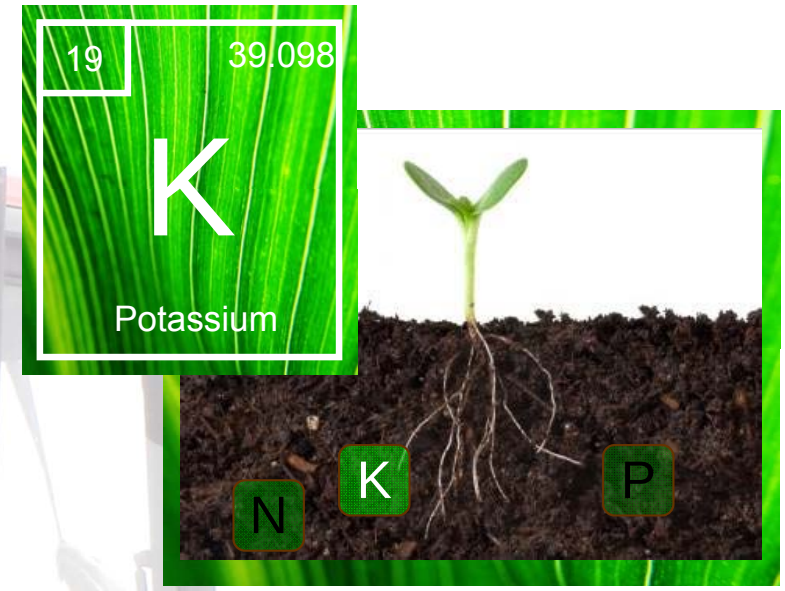
The proposed wells utilize fresh water and brine for "G" class dissolution of naturally occurring salt, transformed to 'table salt' for food, and potassium salt, readily applied as a natural fertilizer to all crops and lawns. Michigan Potash Operating, LLC will have stringent control and supervision over the fluids being circulated. Restated, the fluids being circulated are fresh water and non-hazardous, naturally created salt water, utilized to extract and create food grade sodium and potassium products.

Michigan Potash Operating's sole business purpose is to intelligibly and carefully handle salt water that is created from the making of food grade table salt and natural agricultural fertilizer that American farmers must have to grow our food.

MICHIGAN POTASH

Potash is a natural potassium fertilizer, and the tightest controlled commodity in the world.

- Potash is an essential plant nutrient and nutritional requirement for animals and humans. It has no known substitutes.
- Although potash is used worldwide, only 13 countries and only 13 companies produce it.
- Amongst comparative world commodities, potash is the most tightly controlled.
- Our farmer's rely on potash to grow our food and they pay more for potash than anybody else in the world.



Potassium, Nitrogen, and Phosphorus, the three major elements required for plant growth.

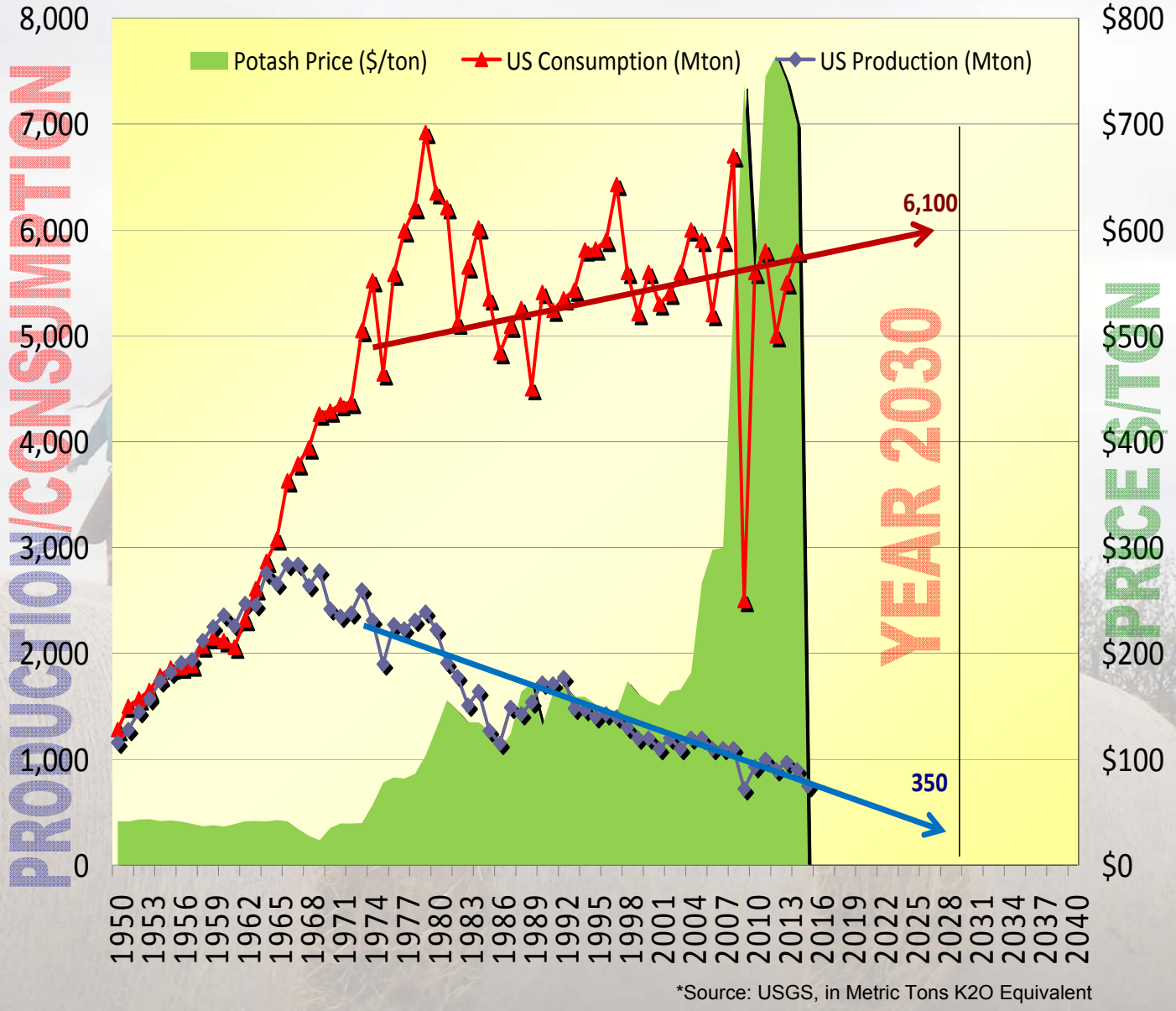
Soybeans with and without the application of Potash.

Source: Potash and Phosphate Institute, USGS

MPC

U.S. Potash import reliance increases year over year.

- U.S. potash production has declined by 65% since 1962.
- U.S. potash demand has increased by 195% since 1962.
- U.S. potash price has increased 1000% since 1962.
- U.S. potash import reliance is 85% annually, and may be as high as 95% by 2030.

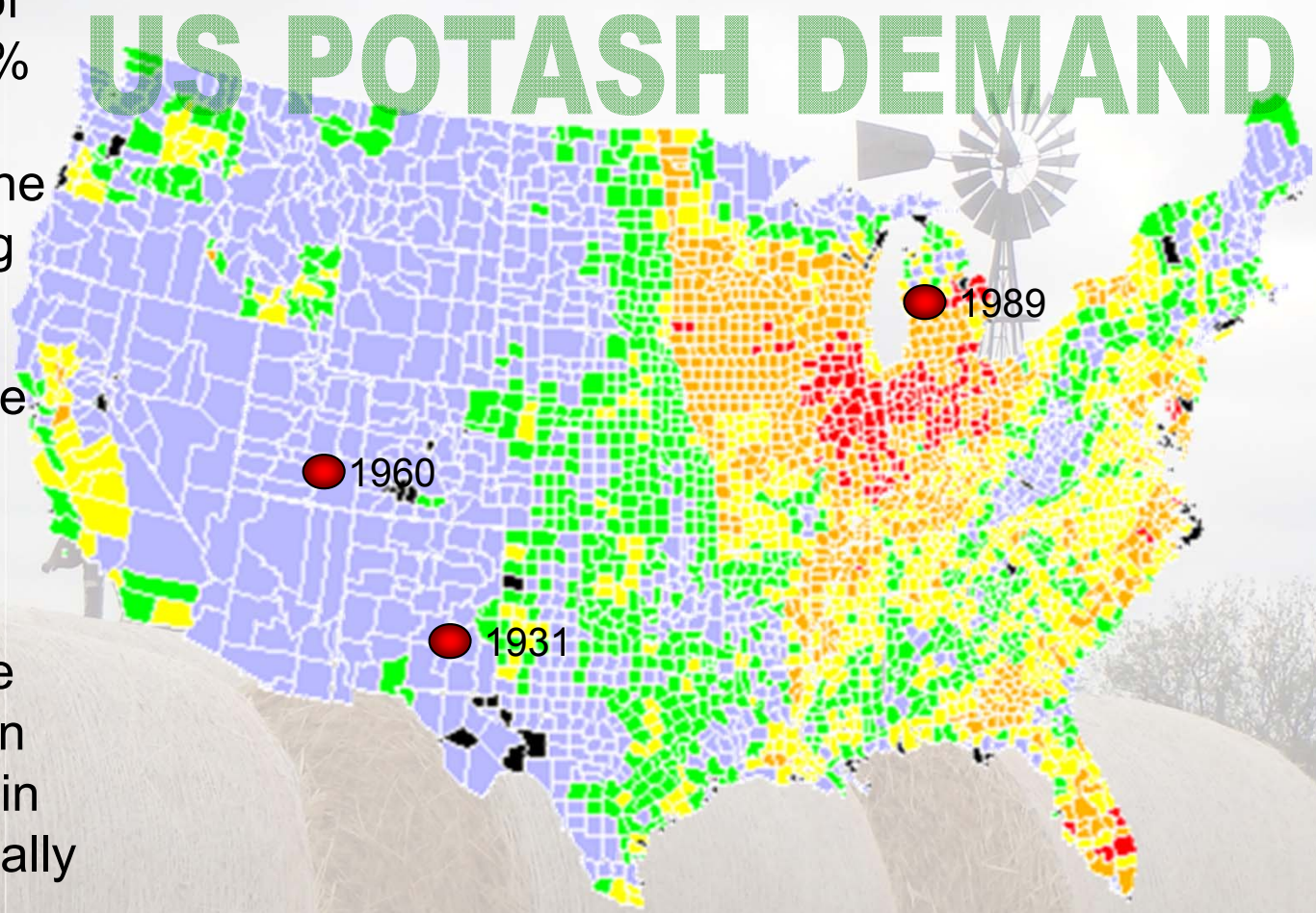


*Source: USGS, in Metric Tons K2O Equivalent

MPC

Potash is critical to agricultural balance of trade

- The U.S. produces 40% of the world's maize and 36% of the world's soybeans. These crops are among the highest potash consuming cash crops.
- The U.S.' agricultural trade balance relies heavily on potash-dependent crops.
- Domestic potash supply principally comes from the Designated Potash Area in New Mexico; established in 1939, it has become critically depleted.



US Potash Production Location and date of commercial production

*Source: USGS, in Metric Tons K2O Equivalent8

MPC

The word's highest grade potash ore is in the U.S. Corn Belt

For thirty years, the quality and quantity of the world's youngest commercial potash discovery was kept a secret.

A beneficiary of the 'Data Preservation Act of 2005, enabled the re-discovery of a critical mineral reserve. The world's highest grade potash resides in the U.S. cornbelt, where it is needed most.

MPC

BRIEF

Michigan Potash Operating proposes a Class III Area Permit, for the purpose of extracting food grade, subsurface deposits of 'table salt' (sodium chloride) and potash (potassium chloride). The deposits are extracted via circulating both fresh and naturally created salt water brine with no artificial or man made constituents or chemicals whatsoever, to extract and produce food grade, subsurface deposits of 'table salt' (sodium chloride) and potash (potassium chloride).

The proposed Area Permit, is as follows:

Qtr	Section	Township	Range	County
ALL	30, 31	17N	8W	Osceola
ALL	25, 36	17N	9W	Osceola
S/2	35	17N	9W	Osceola
E/2 SE/4	34	17N	9W	Osceola
ALL	6	16N	8W	Mecosta
N/2	7	16N	8W	Mecosta

The proposed Class III permit immediate borders an active Class III Area and active Class I injection well areas, also for the purpose of salt and potash production. The area of review has been extensively reviewed and permitted via prior approved and currently active Class I non hazardous, Class III Area permits, and oil and gas well permits. It is also an area of historically active oil and gas development.

The proposed extraction interval is in the Salina A Group, which is a salt and potash bearing interval, the top of which occurs at a depth of 7,150' below surface.

The Salina A Group is accessed via centrally located, directionally drilled wellbores, utilizing advancements in best available technology that enables access to the Salina A Group from an area approximating 2.5 Acres, and thereafter, as is needed from time to time, from centrally located drilling pads of similar design.

Extensive work has been performed to identify and understand the lowermost underground source of drinking water within the AOR and at the proposed wells location. The lowest possible USDW is the base of the glacial till. The deepest occurrence of glacial till in the AOR is 614 feet. Below the glacial till and into the Jurassic redbeds, TDS is typically in excess of 35,000. The AOR is basin centered, whereby, TDS tends to increase rapidly in the Jurassic redbeds.

Operating procedures, and environmental, health, and safety precautions are well established due to well understood and pre-established operations in the immediate area of review; where active Class I and Class III operations have been operational for over 25 years.

US EPA UIC PERMIT APPLICATION FORM 7520-6

Sodium and Potassium

CLASS III

THE UNITED STATES POTASH PROJECT
APRIL 2015

US EPA UIC PERMIT APPLICATION FORM 7520-6

Sodium and Potassium

CLASS III

ATTACHMENT A: AREA OF REVIEW

THE UNITED STATES POTASH PROJECT
APRIL 2015

ATTACHMENT A
AREA OF REVIEW METHODS

EPA instruction, form 7520-6 (2011):
AREA OF REVIEW METHODS - Give the methods and, if appropriate, the calculations used to determine the size of the area of review (fixed radius or equation). The area of review shall be a fixed radius of 1/4 mile from the well bore unless the use of an equation is approved in advance by the Director.

The area of review ("AOR") radius for a Class III Area permit was established by USEPA Region 5 guidance as to be ¼ mile beyond the boundary of the proposed Class III Area.

- **Figure A1** is a locator map, showing the proposed Class III Area, located in Osceola and Mecosta County Michigan and associated AOR, defined by drawing a 1/4 mile boundary around the proposed Class III Area.

- **Figure A2** is a USGS Topographic Map extending at least mile beyond the property boundaries and showing the proposed Class III Area (purple), and Class III AOR, extending one quarter (¼) of a mile around the proposed Class III permit area (light blue). This map also shows roads (black) and the Public Land Survey System (dark blue).

The AOR has been the subject of extensive and comprehensive prior geological and environmental review, and re-review by all interested stake holders and regulatory agencies and predecessor companies to Michigan Potash Operating, LLC, having been the subject of prior permit applications for both Class I and Class III non hazardous injection. Predecessor owners of interest include, Kalium Chemicals, Ltd., IMC Kalium, Ltd., PPG Industries, Inc., and Mosaic Hersey Potash, LLC.

- **Figure A3** is a graphical representation showing the AOR over historical AOR's. A portion of the documents surrendered here reference the available data covering over 30 years of potash and salt extraction within the AOR.

- **Figure A4** is a USGS Topographic Map showing the proposed Class III AOR in reference to the Class I Non Hazardous AOR for MI-133-1I-0004, MI-133-1I-0005 and MI-133-1I-0006, submitted January 16, 2015 by Michigan Potash Operating. The proposed Class III AOR is encircled by the above referenced Non Hazardous Class I AOR(s); enabling a concurrent technical review.

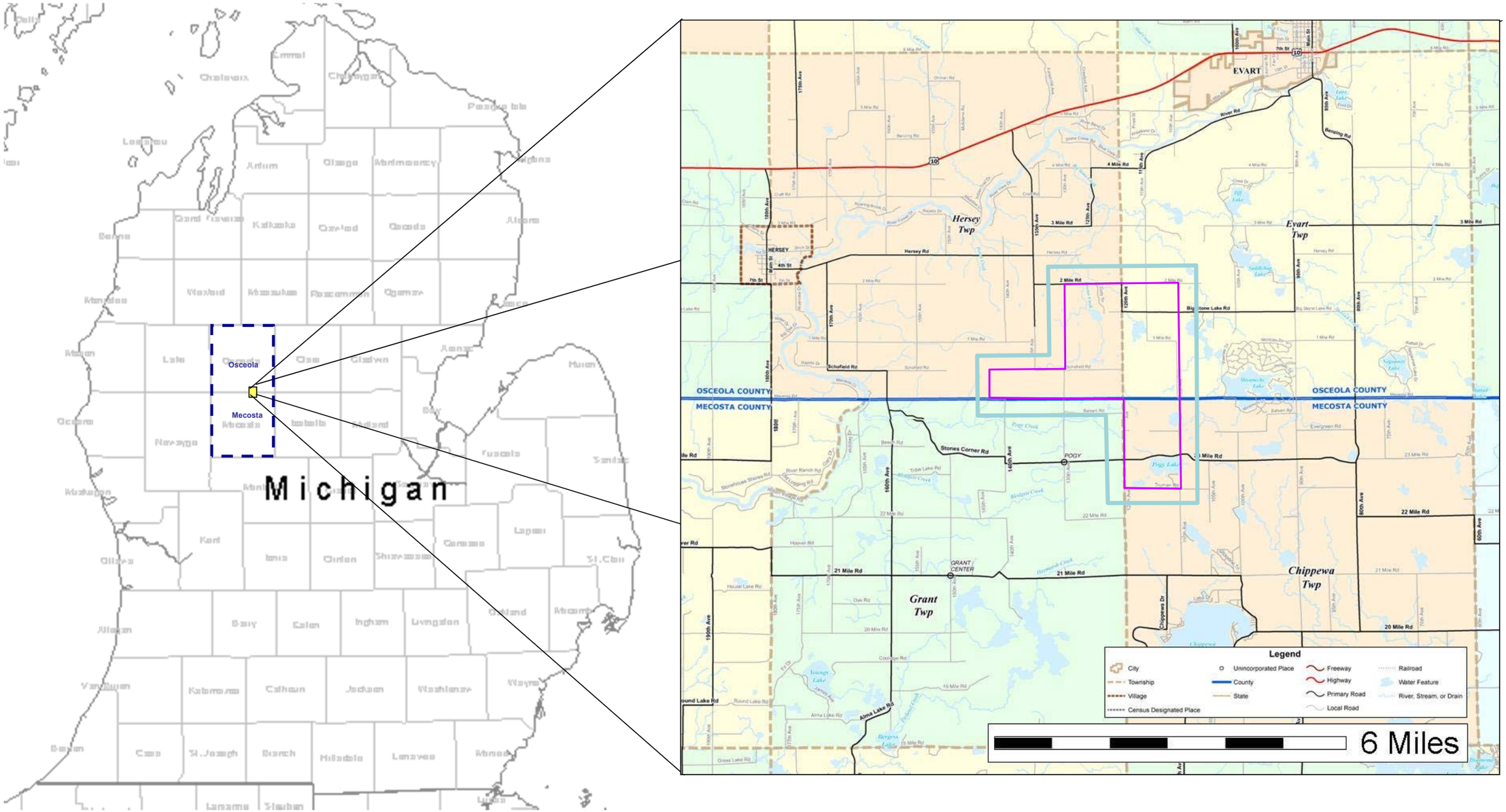


Figure A1. Locator Map, showing the proposed Class III permit area (Purple) and Class III permit 'Area of Review ('AOR')'. The proposed permit includes both Osceola and Mecosta County Michigan.

MICHIGAN POTASH OPERATING, LLC

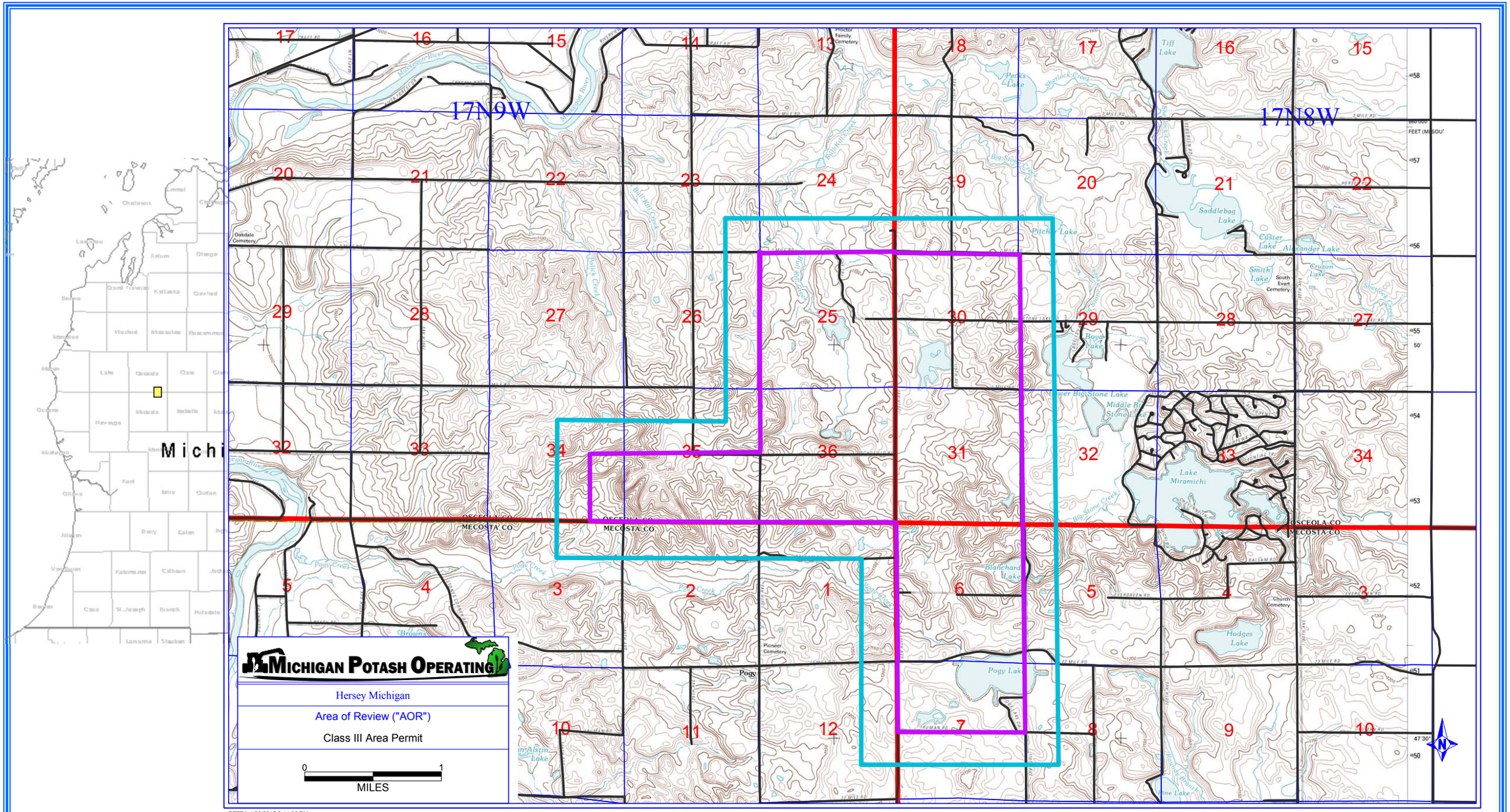


Figure A2. USGS Topographic Map extending at least mile beyond the property boundaries and showing the proposed Class III Area (Purple), and Class III area of review, extending one quarter (¼) of a mile around the proposed Class III permit area. This map also shows roads (Black) and the Public Land Survey System (Blue).

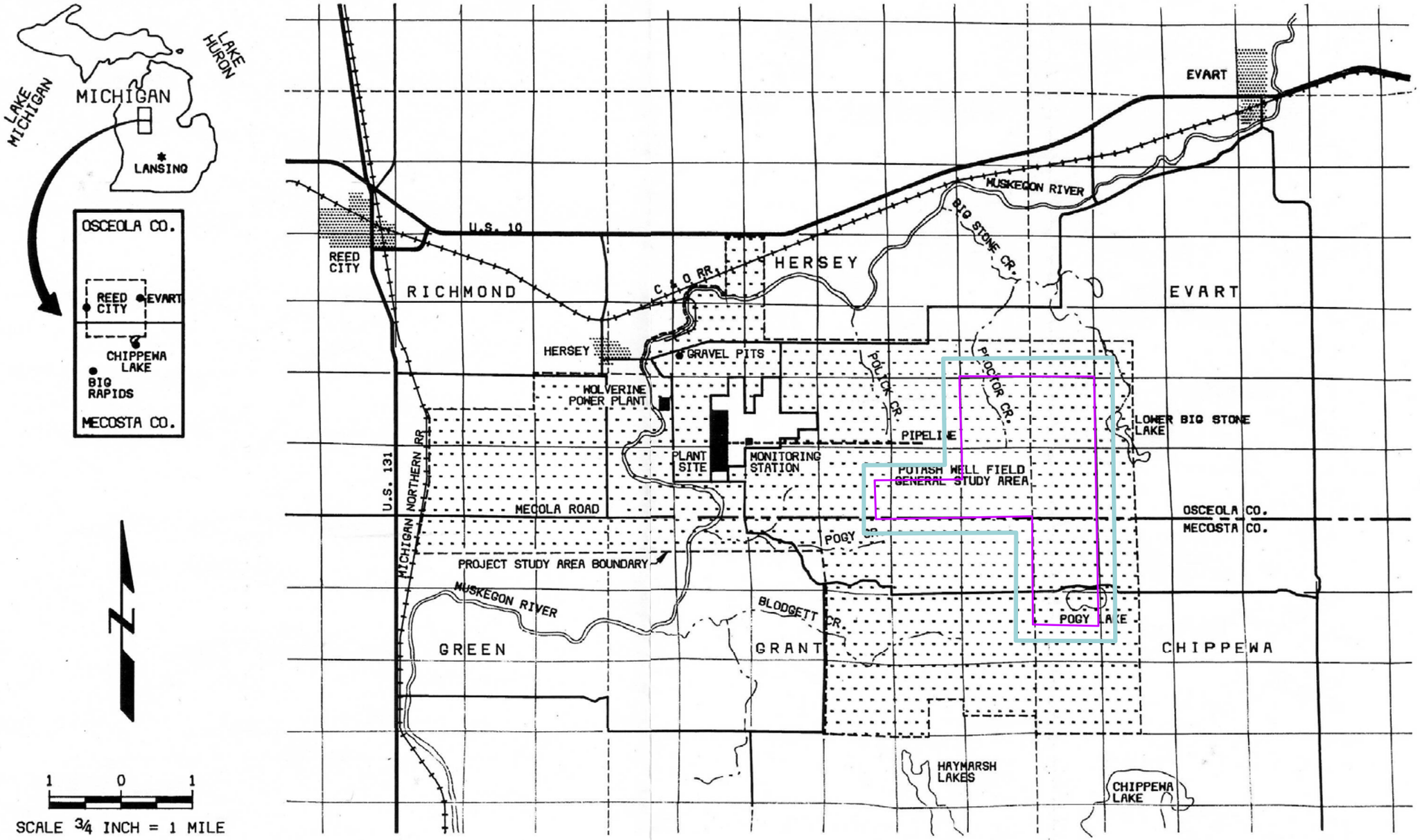


Figure A3. Map showing prior extensive studies covering the proposed AOR by Pittsburg Plate and Glass, under its Kalium Subsidiary, between 1980 and 1989.

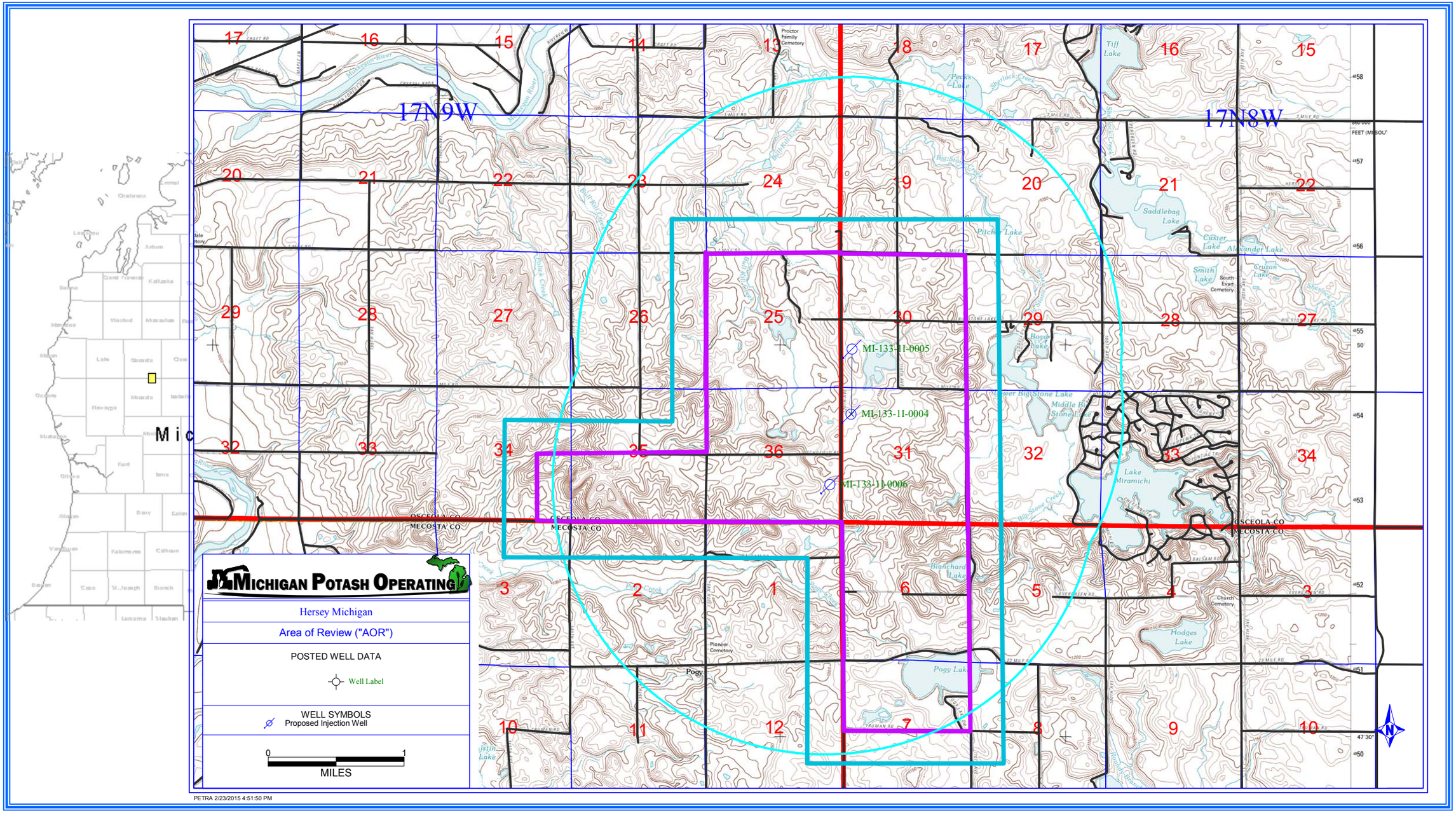


Figure A4. USGS Topographic showing the proposed Class III Area (Purple), and Class III area of review (light blue square), extending one quarter (¼) of a mile around the proposed Class III permit area in relation to Class I Non Hazardous AOR for MI-133-1I-0004, MI-133-1I-0005 and MI-133-1I-0006, submitted January 16, 2015 by Michigan Potash Operating. This map also shows roads (Black) and the Public Land Survey System (Blue).

MICHIGAN POTASH OPERATING, LLC

US EPA UIC PERMIT APPLICATION FORM 7520-6

Sodium and Potassium

CLASS III

ATTACHMENT B: MAPS OF WELL/AREA AND AREA OF REVEW

THE UNITED STATES POTASH PROJECT
APRIL 2015

ATTACHMENT B
MAP OF WELLS/AREA OF REVIEW

EPA instruction, form 7520-6 (2011):

MAPS OF WELLS/AREA AND AREA OF REVIEW - Submit a topographic map, extending one mile beyond the property boundaries, showing the injection well(s) or project area for which a permit is sought and the applicable area of review. The map must show all intake and discharge structures and all hazardous waste treatment, storage, or disposal facilities. If the application is for an area permit, the map should show the distribution manifold (if applicable) applying injection fluid to all wells in the area, including all system monitoring points.

B.1 Major Intake and Discharge Structures for Liquid Waste

NO major intake and discharge structures for liquid waste were located in the AOR

B.2 Hazardous Waste, Storage or Disposal Facilities

There are NO hazardous wastes being generated within the AOR according to the Hazardous Waste Biennial Report.

The Hazardous Waste Report (Biennial Report) collects data on the generation, management, and minimization of hazardous waste. This provides detailed data on the generation of hazardous waste from large quantity generators and data on waste management practices from treatment, storage, and disposal facilities. The Biennial Report data provide a basis for trend analyses. Data about hazardous waste activities is reported for odd number years (beginning with 1989) to EPA. EPA then provides reports on hazardous waste generation and management activity that accompany the data files.

There have been NO hazardous waste releases within the AOR according to the Superfund, CERCLIS database.

Superfund is a program administered by the EPA to locate, investigate, and clean up the worst hazardous waste sites throughout the United States. Before Superfund, Americans were less aware of how dumping chemical wastes might affect public health and the environment. Hazardous wastes were often left in the open, where they seeped into the ground, flowed into rivers and lakes, and contaminated soil and groundwater. Consequently, where these practices were intensive or continuous, there were uncontrolled or abandoned hazardous waste sites. These sites include abandoned warehouses, manufacturing facilities, processing plants, and landfills. Citizen concern about the extent of this problem prompted Congress in 1980 to establish the Superfund Program to eliminate the health and environmental threats posed by hazardous waste sites.

There are NO hazardous waste handler and registered FRS facility within the AOR according to RCRA Info via the Envirofacts Database Warehouse.

There is ONE hazardous waste handler located registered ¼ mile East of the AOR, located in Section 26, Township 17 North, Range 9 West, Michigan Meridian, submitted here for informational purposes as follows:

HANDLER NAME	HANDLER ID	ADDRESS	LAT	LONG	FRS ID
Mosaic Potash Hersey, LLC*	MIR000004440	1395 135th Ave Hersey, MI 49639	43.8348	-85.3553	110001842436

*Checked on Evirofacts database 3/27/2015

Contact Information:

NAME	STREET	CITY	STATE	ZIP CODE	PHONE	TYPE OF CONTACT
KARL TOMASZEWSKI	1395 135TH AVE	HERSEY	MI	49639	2318328838	Public/Permit

Hazardous waste information is contained in the Resource Conservation and Recovery Act Information (RCRAInfo), a national program management and inventory system about hazardous waste handlers. In general, all generators, transporters, treaters, storers, and disposers of hazardous waste are required to provide information about their activities to state environmental agencies. These agencies, in turn pass on the information to regional and national EPA offices. This regulation is governed by the Resource Conservation and Recovery Act (RCRA), as amended by the Hazardous and Solid Waste Amendments of 1984. You may use the Hazardous Waste Search to determine identification and location data for specific hazardous waste handlers, and to find a wide range of information on treatment, storage, and disposal facilities regarding permit/closure status, compliance with Federal and State regulations, and cleanup activities. There is also information on related Laws and regulations.

There are Four Michigan Part 201 locations identified within the area of review as per the following; listed below:

SITENAME	SITE_ID	ADDRESS	POLLUTANTS	LATITUDE	LONGITUDE
Vukin 1-19 (PN 38463)	67000019		Cl; Brine/chlorides; Crude oil	43.84386	-85.31469
Wark 1-30 (PN 35977)	67000020		Cl; Brine/chlorides; Crude oil	43.84216	-85.31214
Paine 1-35 (PN 36186)	67000017		Cl; Brine/chlorides	43.82736	-85.35073
Paine 1-26 (PN 37317)	67000018		Cl; Brine/chlorides	43.83339	-85.34614

The Vukin 1-19 (Drilled and Abandoned), Wark 1-30 (Drilled and Abandoned), Paine 1-35 (Producing Gas Well, Clinton Formation), and Paine 1-26 (Producing Gas Well, Clinton Formation) are oil and gas wellbore locations. The Paine 1-35 and Paine 1-26 are currently producing natural gas.

There is ONE additional Michigan Part 201 location located outside of the AOR, ¼ mile East, located in Section 26, Township 17 North, Range 9 West, Michigan Meridian, submitted here for informational purposes as follows:

SITENAME	SITE_ID	ADDRESS	POLLUTANTS	LATITUDE	LONGITUDE
Kalium Chemicals	67000064	395 135th Ave and 11126 140th Hersey, MI 49639	Cl; Diesel fuel	43.84145	-85.36223

B.3 Distribution Manifold and Associated Monitoring Points

This Class III Area will be developed via directionally drilled multiple well pads; and therefore, the multiple well pad will have a distribution manifold associated with servicing multiple wellhead.

All water handling manifolds are designed as zero release systems. Any release of water along the manifold or between the manifold and the wells will be captured by secondary and tertiary containment (See Section K, Injection Procedures Figure K.2). Any releases to natural sediment will be considered an inadvertent release that has occurred outside specific secondary and tertiary containment barriers. Any proposed Class III well can serve as both an injection and return well. A well may be both an injector and return well simultaneously on its own, or an injector or return well in a collaborative pair (See Section K, Injection Procedures). The manifold monitoring points and monitoring information is shown as follows:

At *MANIFOLD*	Description	Flow Rate	Pressure	Temperature	Conductivity
Well 1	At Injection and Return	X	X	X	X
Well 2	At Injection and Return	X	X	X	X
Well 3	At Injection and Return	X	X	X	X
Well 4	At Injection and Return	X	X	X	X
Well 5	At Injection and Return	X	X	X	X
Well 6	At Injection and Return	X	X	X	X
Well 7	At Injection and Return	X	X	X	X
Well 8	At Injection and Return	X	X	X	X
At WELLHEAD	**Description**	**Flow Rate**	**Pressure**	**Temperature**	**Conductivity**
Well 1	At Injection and Return	-	X	-	-
Well 2	At Injection and Return	-	X	-	-
Well 3	At Injection and Return	-	X	-	-
Well 4	At Injection and Return	-	X	-	-
Well 5	At Injection and Return	-	X	-	-
Well 6	At Injection and Return	-	X	-	-
Well 7	At Injection and Return	-	X	-	-
Well 8	At Injection and Return	-	X	-	-

Figure B1 is a USGS Topographic Map showing the initial proposed pad development size and position in relation to the AOR, located in the SW/4 NW/4 NW/4 Section 31 17N R8W. The purpose of this figure is to show the distribution manifold (To SCALE) in relation to the Class III wells as currently planned. The Public Land Survey System is included. Flow rate, pressure, temperature, and conductivity will be measured at the manifold for both feed and return streams. Pressure will be measured at the wellhead, on both the tubing and annular side.

For ease of reference, and as required as per Appendix B, the distribution manifold is shown on all AOR maps, Figure B1 through Figure B9.

B.4 Public Water Systems or other pertinent information known to the applicant

There are no known public water systems within the AOR.

All piping from the manifold to the wells, will be above ground and heat traced, so as to ensure easy access and immediate visual leak detection. The distribution manifold and well locations will be monitored real time via automated alarming systems and visited multiple times daily.

ATTACHMENT B
MAP OF WELLS/AREA OF REVIEW CONTINUED:

EPA instruction, form 7520-6 (2011):
Within the area of review, the map must show the following:

For Class III
The number, or name, and location of all producing wells, injection wells, abandoned wells, dryholes, surface bodies of water, springs, mines (surface and subsurface), quarries, and other pertinent surface features, including residences and roads, and faults, if known or suspected. In addition, the map must identify those wells, springs, other surface water bodies, and drinking water wells located within one quarter mile of the facility property boundary. Only information of public record is required to be included in this map. For Class III, also include Public water systems and pertinent information known to the applicant.

For brevity, to ease understanding, and to match the intent of form 7520-6, the remainder of ATTACHEMENT B has been limited to ***Maps and Map descriptions*** to illustrate the required EPA checklist items, as appears to be the intent of the instructions for form 7520-6 (2011). Additional comment and tabular data is found in subsequent and related ATTACHEMENTS.

For ease of reference and review, multiple graphical maps have been illustrated over the AOR. All of the maps in this section include the proposed injection well locations and the Public Land Survey System ontop of the United States Geological Survey Topographic Quadrangle for the AOR. Together, they fulfill all the checklist items as required by Federal Form 7520-6; as follows:

- **Figure B2** shows all producing wells in relation to the proposed injection wells in the AOR. The Public Land Survey System is included ontop of the United States Geological Topographic Quadrangle.

- **Figure B3** shows active Class I NON-HAZARDOUS Injection Wells; the Thomas 1-26 (NW4NW4 Section 26) and the Woodward 1-26 (NE4SW4 Section 26) in relation to the AOR, both operated by Mosaic Hersey Potash, LLC. Both wells are outside of the Class III AOR.

- **Figure B4** shows established Class III *AREA* Injection Permit No. MI-133-3G-A0002 (Yellow Cross Hatch) and all Active and Inactive Class III Injection Wells. The AOR has undergone extensive prior regulatory review as a result of the active Class I and Class III wells in the immediate AOR. All Active and plugged Class III wells are outside of the proposed Class III AOR, but are shown for reference.

- **Figure B5** shows all plugged wells, shallow or deep within the area of review. Total depths of each well is listed next to its well symbol. Also shown on this map are the API Serial numbers. The serial number is illustrated and defined below:

State	–	County	–	**Serial**	–	Completion
21	-	133	-	#####	-	00-00

Mineral wells available to the public record or made known to the applicant are also shown. These wells are preceded with the letter "M" before the listed Serial No.

The State of Michigan has adapted a 'pseudo API No,' utilizing the mineral permit number as an API Serial No. As an example; M4999 would have the equivalent Mineral Well API designation of :

State	–	County	–	**Serial**	–	Completion
21	-	133	-	0**4999**	-	**70**-00

These numbers can be quickly cross referenced with public records, and or the tabular sections following in ATTACHEMENT C. On this map, there are shallow (that do not penetrate any confining horizon) and deep (that penetrate the Class III horizon) within the AOR. Total Depths are listed. For reference while reading this map, the Class III Salina A Group will occur at an approximate depth of 7,200'. There are several shallow Michigan Stray wells that do not penetrate the Class III horizon.

- **Figure B6** specifically highlights and outlines all surface bodies of water and springs on the USGS topographic quadrangle 7 ½ minute series, in addition to showing all wells of public record and all roads.

  There are NO surface and subsurface mines.

  There are NO surface quarries.

  There are NO known faults. The Area of Review has been comprehensively studied by Michigan Potash Operating, LLC and numerous consultants and predecessor companies, geologically investigating the possibility of known faults. There are no known faults located within the Area of Review.

- **Figure B7** shows all surface residencies. Residences have been reviewed via the best available data, via tax roll data at the Osceola County Register and the Mecosta County Register; via conveyance records at the Osceola County Register of Deeds and Mecosta County Register of Deeds. Third party mailing lists were also requested, reviewed and geo referenced (converted to latitude-longitudinal coordinates). It is also expected that every water well accompanies a residence, and therefore, recorded water well addresses have also been included to illustrate residency locations.

- **Figure B8** shows all drinking water wells of public record or known within the AOR.

- **Figure B9**. Composite map of all of the above EPA checklist items, including topography, all major water features, producing wells, injection wells, plugged wells, water wells, residences, roads (black), the public land survey system, and Area Permit No. MI-133-3G-A0002.

Distances from all EPA Checklist items, including all wells of any kind of any nature can be determined via the scale on any of the above referenced figures.

There is no other known pertinent information known to the applicant.

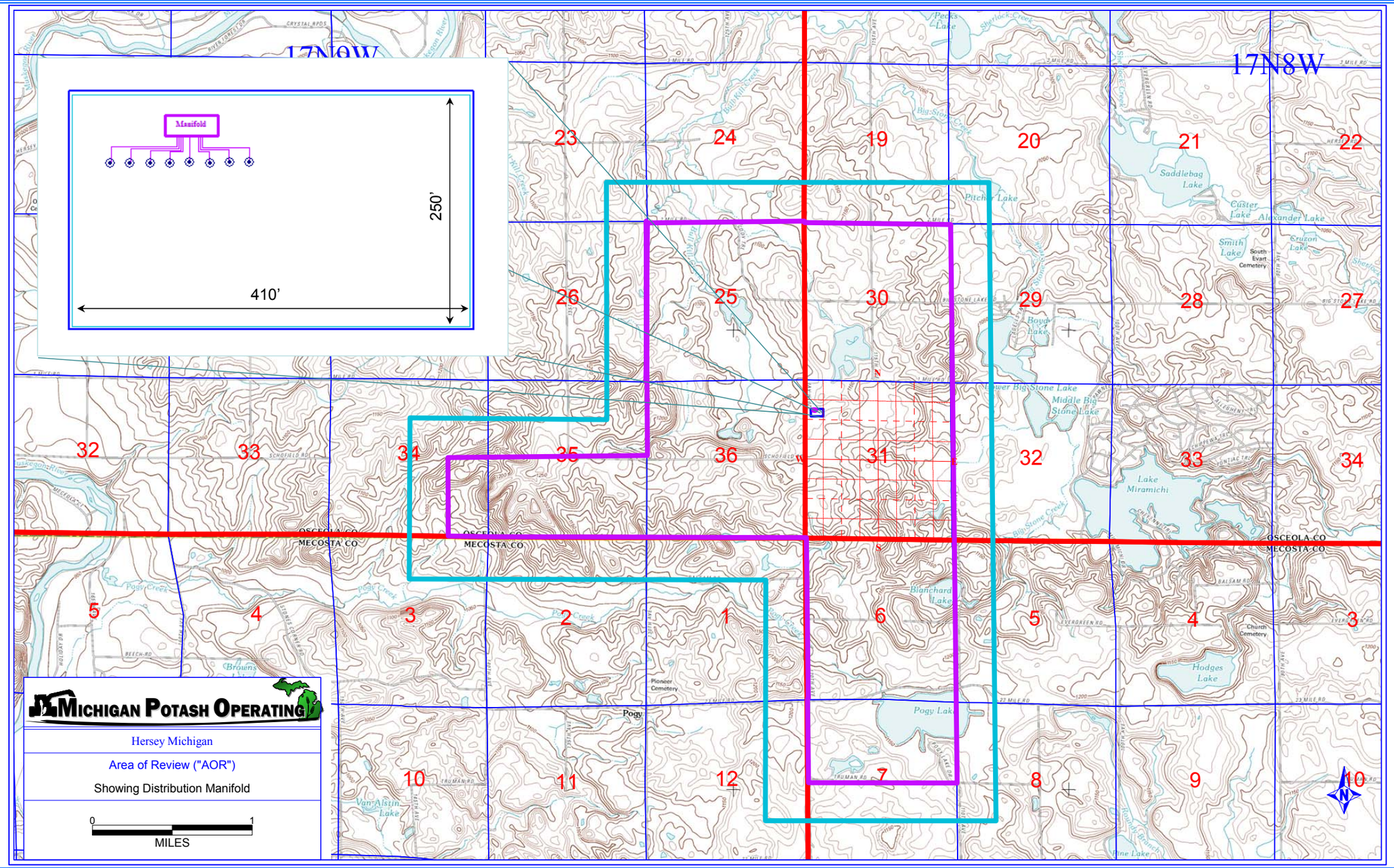


Figure B1. USGS Topographic Map showing the initial proposed pad development size and position in relation to the AOR, located in the SW/4 NW/4 NW/4 Section 31 17N R8W. The purpose of this figure is to show the distribution manifold (To SCALE) in relation to the Class III wells as currently planned. The Public Land Survey System is included. Flow rate, pressure, temperature, and conductivity will be measured at the manifold for both feed and return streams. Pressure will be measured at the wellhead, on both the tubing and annular side.

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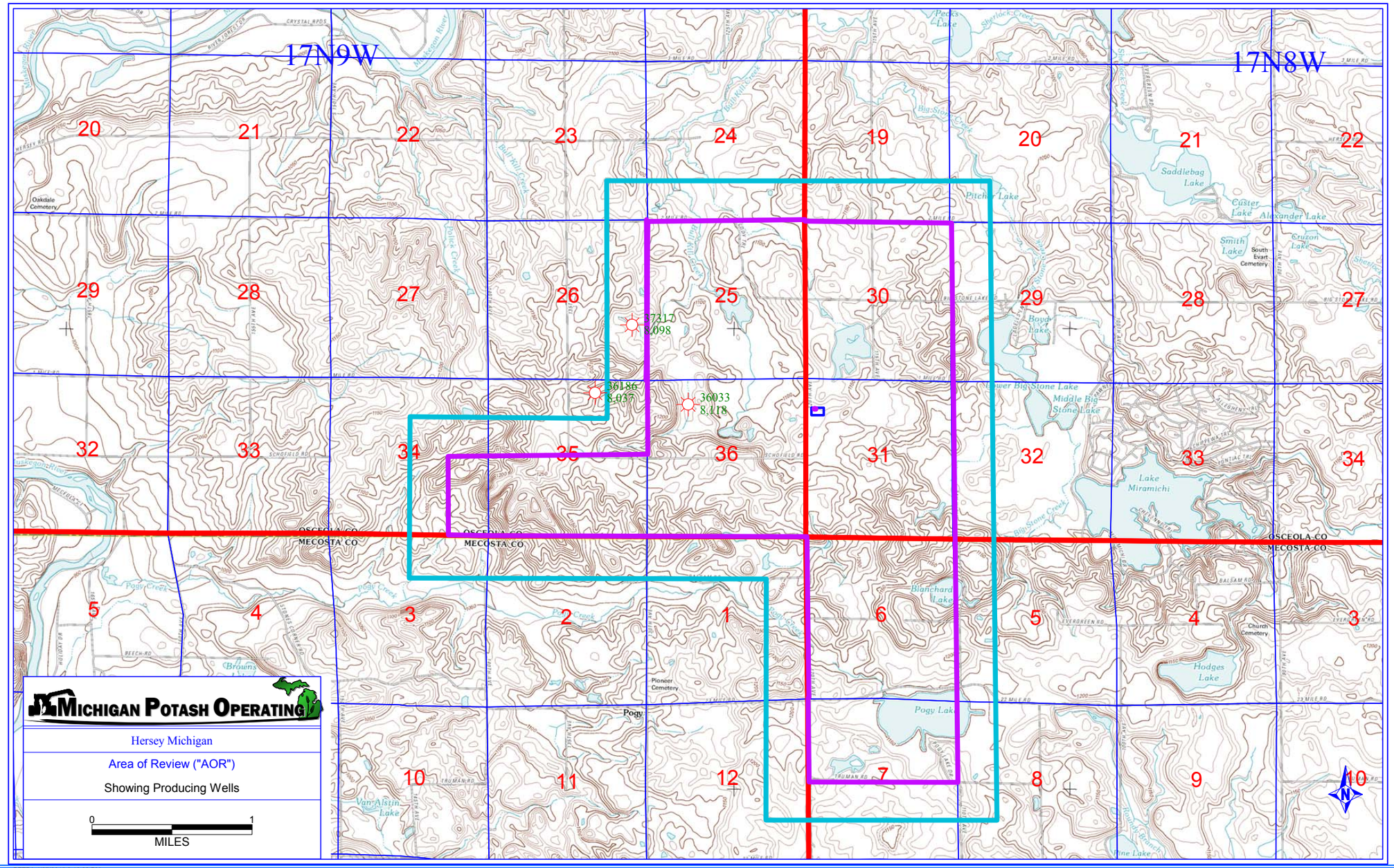

Figure B2. Map showing producing oil and gas wells in relation to the Class III Area (Purple) and Class III AOR (light blue). The proposed initial drilling location can be observed in the NW/4 of the NW/4 of section 31.

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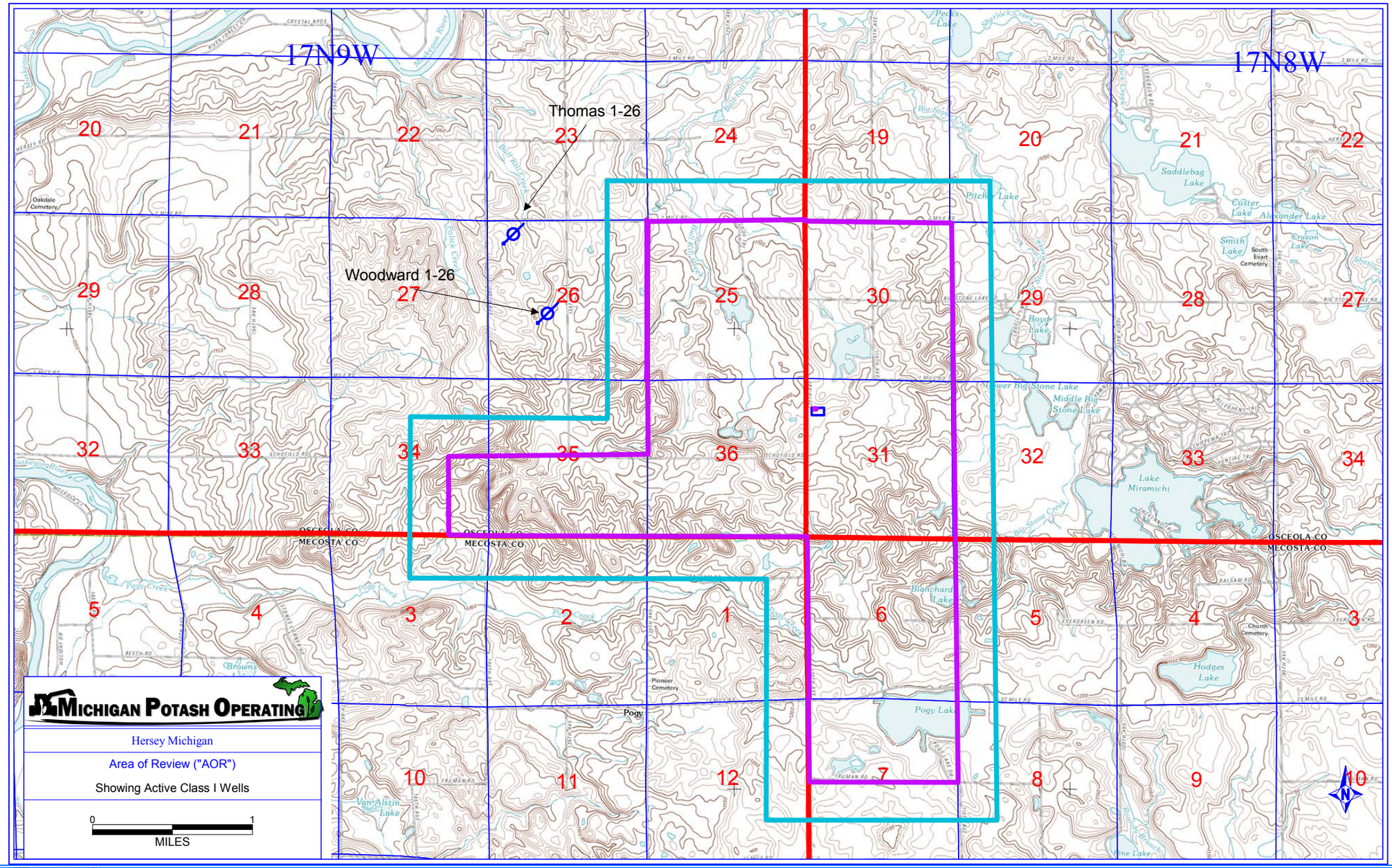

Figure B3. Map showing Existing Class I NON-HAZARDOUS Injection Wells, the Thomas 1-26 (NW4NW4 Section 26) and the Woodward 1-26 (NE4SW4 Section 26).

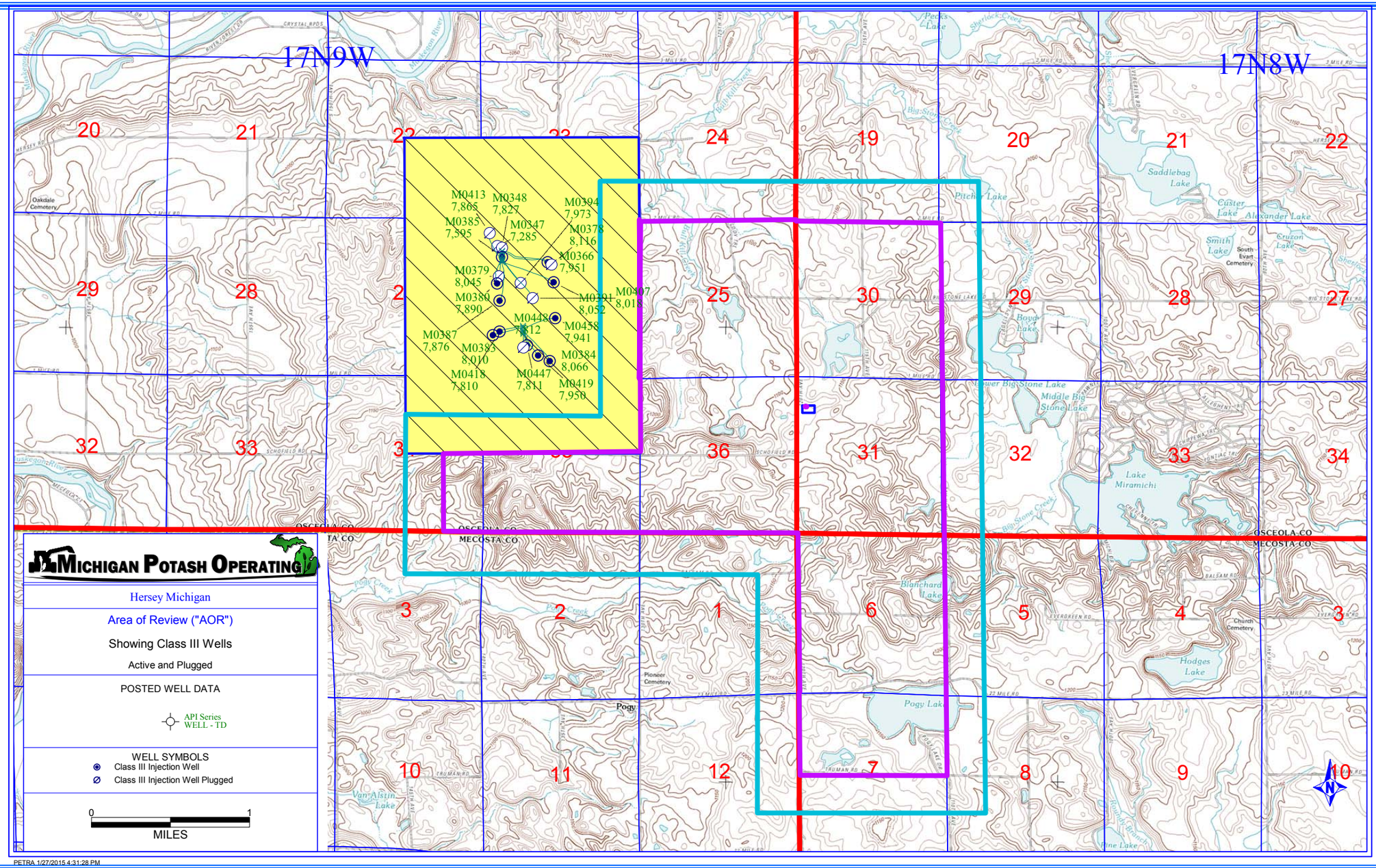

Figure B4. Map showing established Class III Injection Permit No. MI-133-3G-A0002 (Yellow Cross Hatch) and Active and Inactive Class III Injection Wells. All active or plugged Class III associated with MI-133-SG-A0002 are outside the AOR.

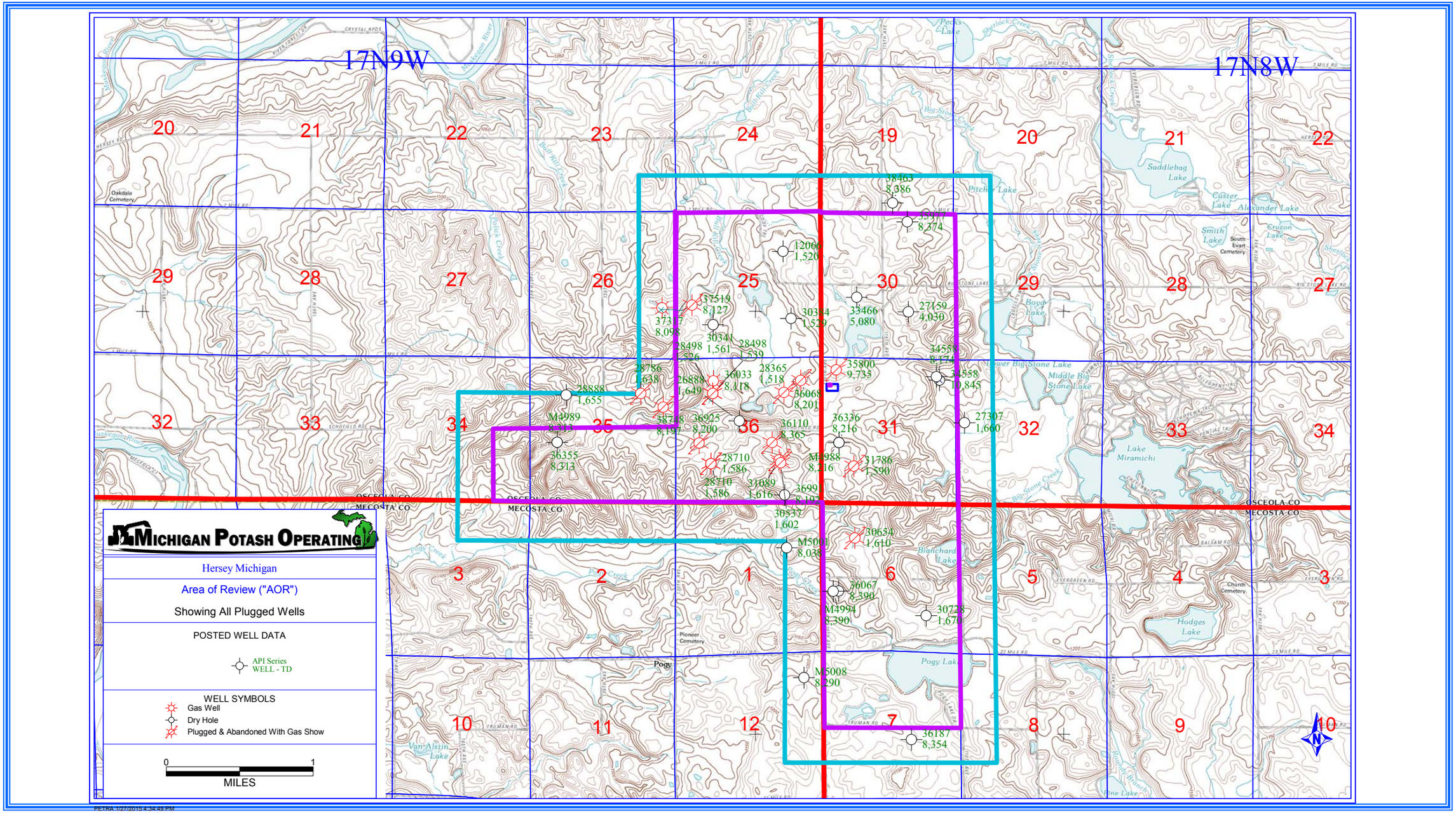

Figure B5. Map showing all plugged wells, shallow (that do not penetrate any confining horizon) or deep (that penetrate the Class III horizon) within the area of review. Total Depths are listed. The Class III Horizon, Salina A Group, will occur at an approximate 7,200'. There are several shallow Michigan Stray wells that do not penetrate the injection or confining horizon.

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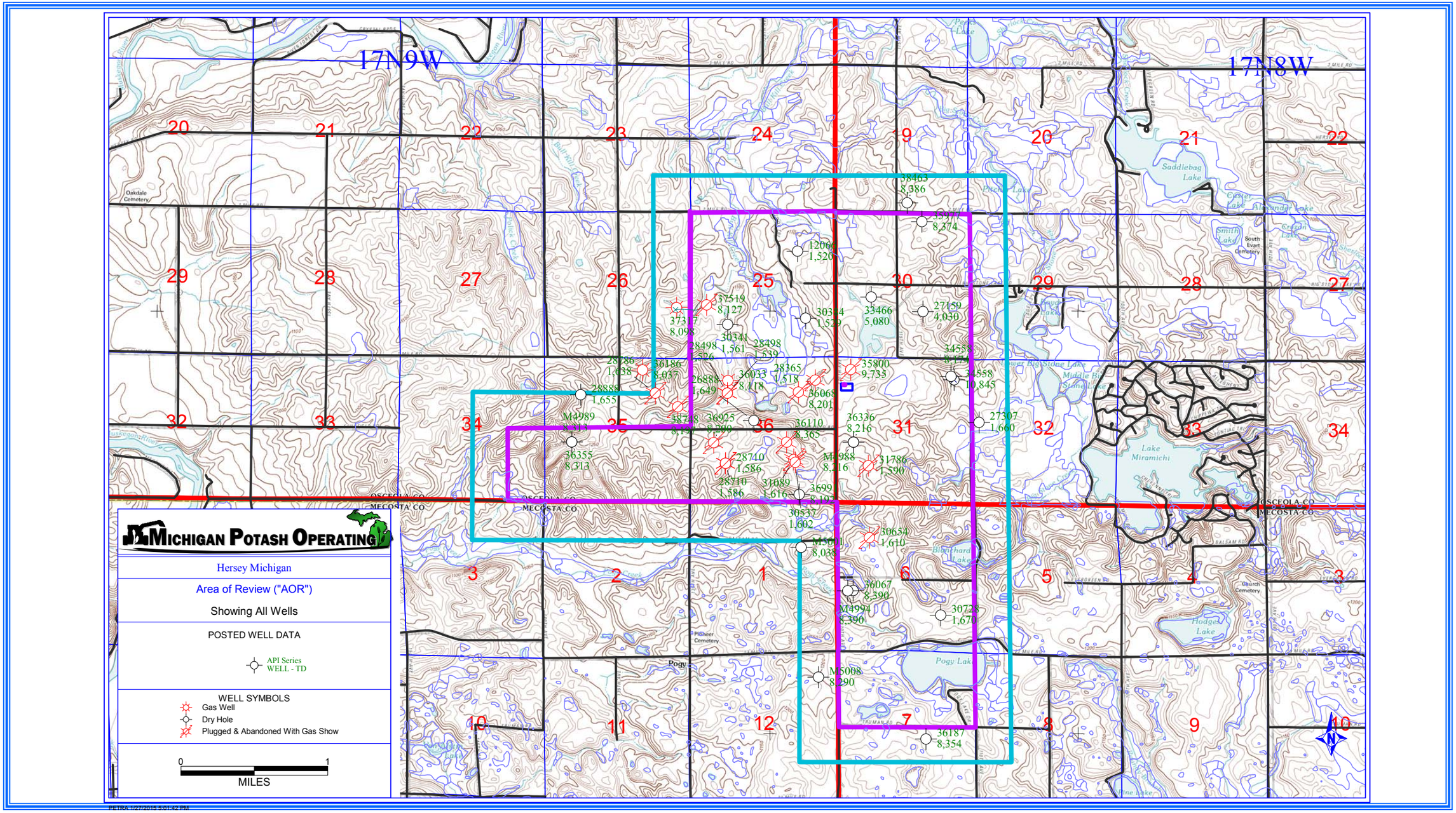

Figure B6. Map showing All well types, active and inactive, within the Area of Review. Shown in blue highlight are surface water bodies. Roads are also shown (black). PLSS is also shown (Blue). Well API series, and Total Depth are listed in GREEN. Mineral Wells are preceded with an M.

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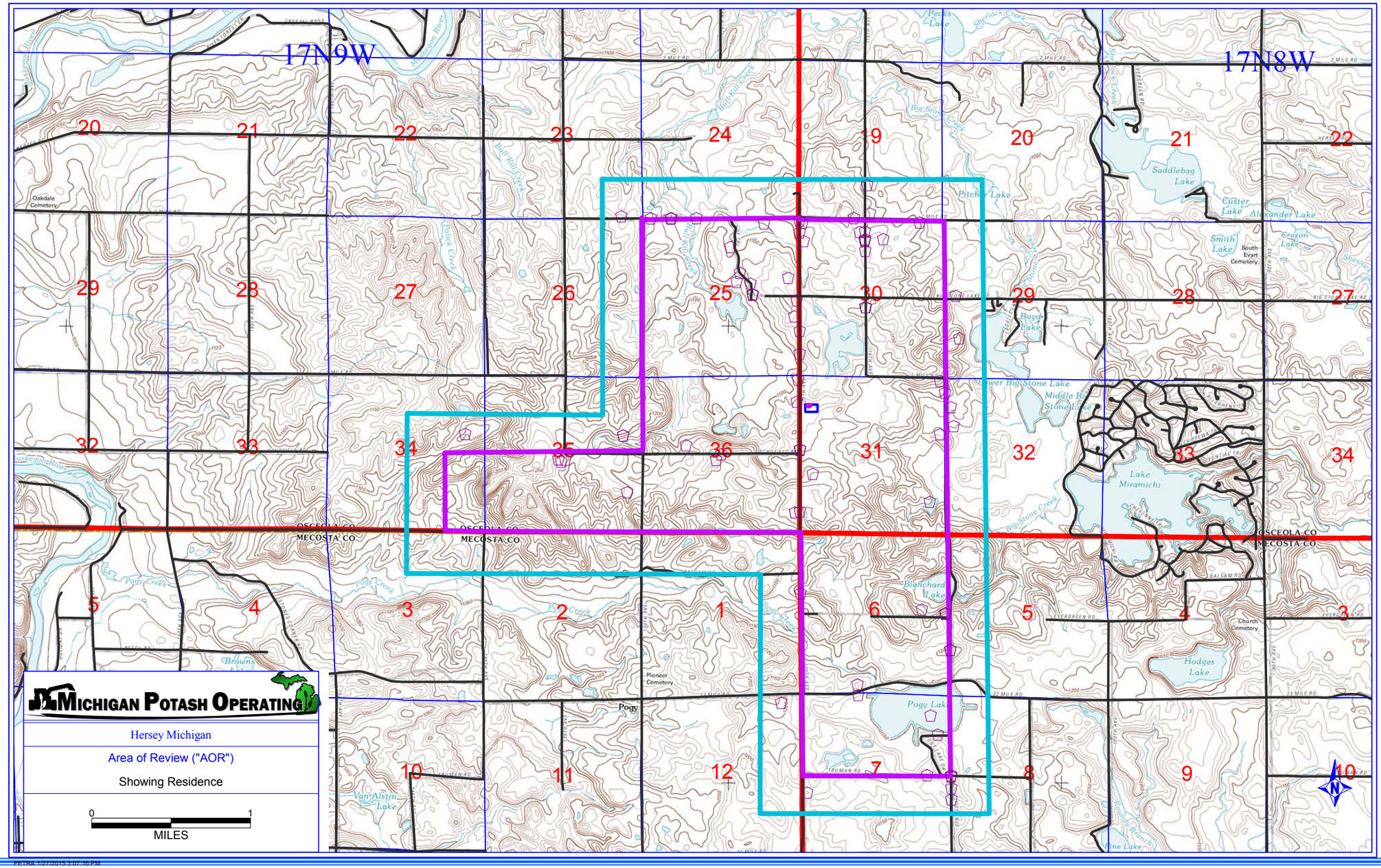

Figure B7. Map showing all residencies. Also showing roads (black), and PLSS (Blue).

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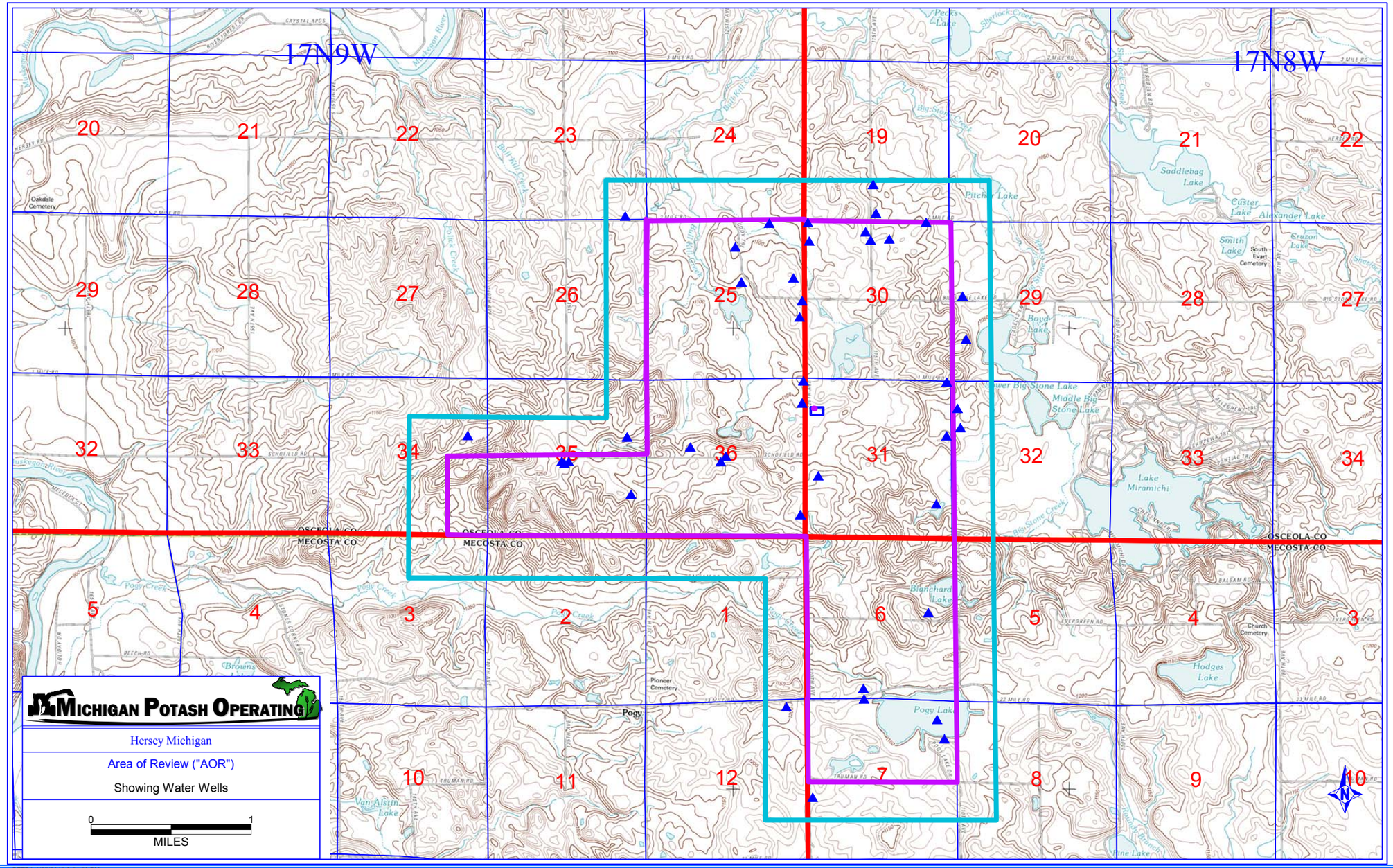

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Figure B8. Map showing all water wells in the area of review in relation to the AOR and topography.

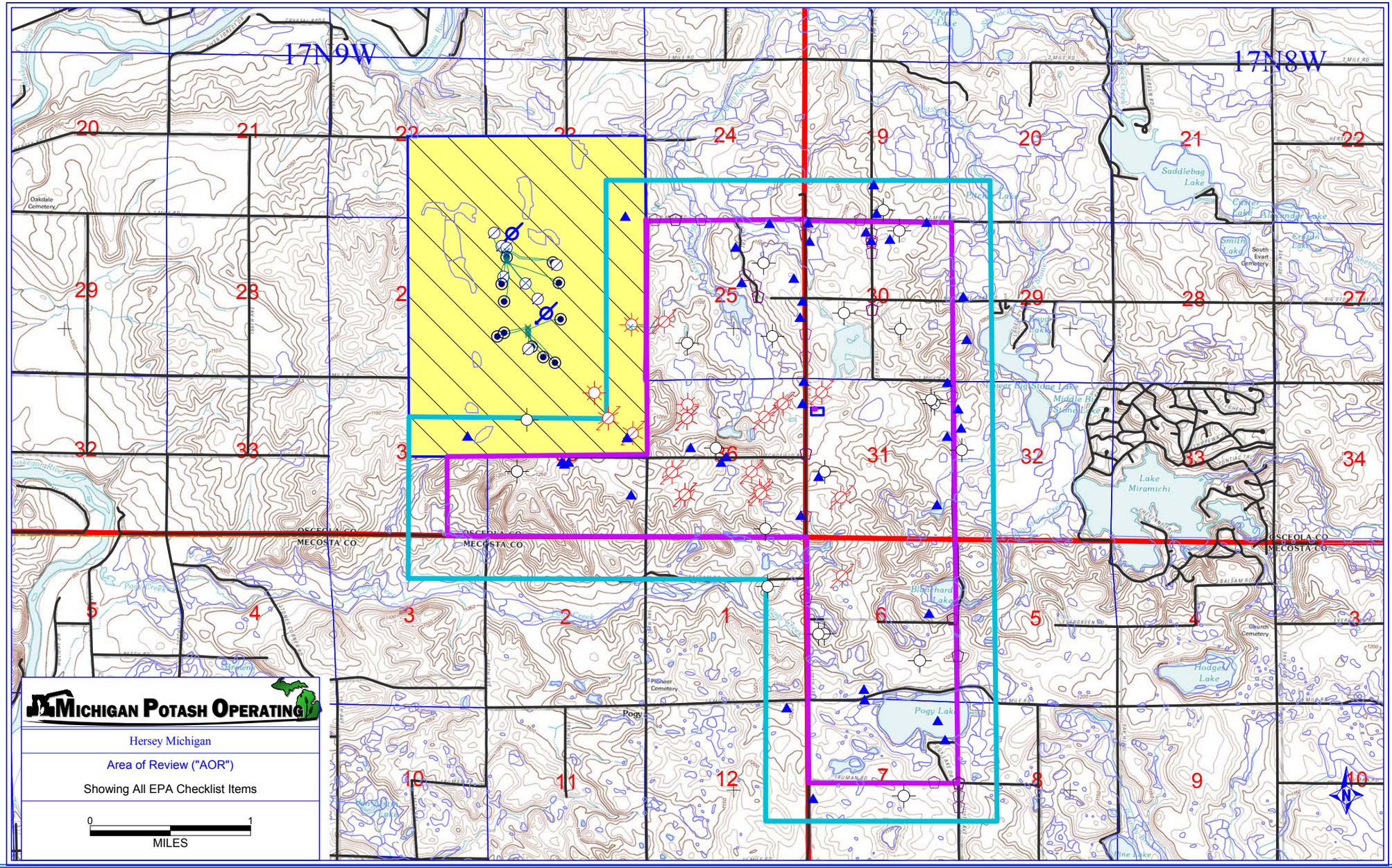

Figure B9. Composite map showing all EPA checklist items including topography, all major water features, producing wells, injection wells, plugged wells, water wells, residences, roads (black), the public land survey system, and Area Permit No. MI-133-3G-A0002.

US EPA UIC PERMIT APPLICATION FORM 7520-6

Sodium and Potassium

CLASS III

ATTACHMENT C: CORRECTIVE ACTION PLAN AND WELL DATA

THE UNITED STATES POTASH PROJECT
APRIL 2015

ATTACHEMENT C.
CORRECTION ACTION PLAN AND WELL DATA

EPA instruction, form 7520-6 (2011):
CORRECTIVE ACTION PLAN AND WELL DATA –Submit a tabulation of data reasonably available from public records or otherwise known to the applicant on all wells within the area of review, including those on the map required in B, which penetrate the proposed injection zone. Such data shall include the following:

For Class III : A description of each well's types, construction, date, drilled, location, depth, record of plugging and/or completion, and any additional information the Director may require. In the case of new injection wells, include the corrective action proposed to be taken by the applicant under 40 CFR 144.55 for all Class III wells.

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C.1 Tabulation of Well Data for all Producing Wells

Records of oil and gas producing wells the state of Michigan are maintained by the MDEQ Division of Oil and Gas and Minerals and the Geological Survey Division. Well permits, completions, and plugging records filed with this agency are organized by county, township, range, and section number.

There are two (2) active producing oil and gas wells are as follows:

TRS	API Number	Permit Number	Well Name and Number	Total Depth	Formation at Total Depth	Drill Date	Well Status	Well Type	WH_Lat	WH_Long	Operator Name
17N-9W-36	21-133-36033-00-00	36033	GREIN ET AL 2-36	8141	CABOT HEAD	Aug-83	ACTIVE	NATURAL GAS WELL	43.82640	-85.33910	Mccool John E
17N-9W-26	21-133-37317-00-00	37317	PAINE 1-26	8095	CABOT HEAD	Feb-84	ACTIVE	NATURAL GAS WELL	43.83360	-85.34620	Mccool John E

Cross Reference with **Figure B2,** which shows all producing wells in relation to the Class III AOR.

There is one (1) active producing oil and gas wells in the immediate proximity of the AOR, as follows:

TRS	API Number	Permit Number	Well Name and Number	Total Depth	Formation at Total Depth	Drill Date	Well Status	Well Type	WH_Lat	WH_Long	Operator Name
17N-9W-35	21-133-36186-00-00	36186	PAINE 1-35	8309	CINCINNATIAN	Dec-82	ACTIVE	NATURAL GAS WELL	43.82740	-85.35080	Mccool John E

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C.2 Tabulation of Well Data for all Active Class I NON HAZARDOUS Injection Wells

There are no injection wells within the AOR. There are two qualifying classes of injection well in the immediate proximity of the AOR: Class I NON HAZARDOUS and Class III. They are listed here separately for ease of reference. Records of injection wells are maintained by the US EPA and the state of Michigan MDEQ Division of Oil and Gas and the Geological Survey Division. Well permits, completions, and plugging records filed with this agency are organized by county, township, range, and section number.

There are zero (0) active Class I Non Hazardous wells in the AOR.

There are two (2) active Class I Non Hazardous within the immediate proximity of the AOR, as follows:

TRS	API Number	Permit Number	Well Name and Number	Total Depth	Formation at Total Depth	Drill Date	Well Status	Well Type	WH Lat	WH Long	Operator Name
17N-9W-26	21-133-00349-70-00	349	WOODWARD 1-26	8140	A-1 SALT	Oct-83	ACTIVE	PART 625, CLASS I NON HAZARDOUS	43.83460	-85.35680	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26	21-133-00350-70-00	350	THOMAS 1-26	8091	A-1 SALT	Jan-84	ACTIVE	PART 625, CLASS I NON HAZARDOUS	43.84180	-85.36110	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC

Cross Reference **Figure B3** shows active Class I NON-HAZARDOUS Injection Wells; the Thomas 1-26 (NW4NW4 Section 26) and the Woodward 1-26 (NE4SW4 Section 26), both operating by Mosaic Hersey Potash, LLC.

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C.3 Tabulation of Well Data for all Active Class III Injection Wells

Within the AOR, there are two qualifying classes of injection well: Class I NON HAZARDOUS and Class III NON HAZARDOUS. This section lists here Class III wells only for ease of reference. Records of injection wells are maintained by the US EPA and the state of Michigan MDEQ Division of Oil and Gas and the Geological Survey Division. Well permits, completions, and plugging records filed with this agency are organized by county, township, range, and section number.

There are zero (0) active Class III wells in the AOR.

There are fifteen (15) active Class III, Part 625 Wells just outside the AOR, as follows:

TRS	API Number	Permit Number	Well Name and Number	Total Depth	Formation at Total Depth	Drill Date	Well Status	Well Type	WH_Lat	WH_Long	Operator Name
17N-9W-26	21-133-00449-70-00	449	KALIUM HERSEY 2042	UNK	A-1 SALT	Jun-00	ACTIVE	PART 625, CLASS III	43.83310	-85.35910	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26	21-133-00474-70-00	474	I M C POTASH HERSEY 1061	UNK	A-1 SALT	Jan-02	ACTIVE	PART 625, CLASS III	43.83910	-85.36170	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26	21-133-00384-70-00	384	KALIUM 2061	8066	A-1 SALT	May-85	ACTIVE	PART 625, CLASS III	43.83290	-85.35920	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26	21-133-00391-70-00	391	KALIUM HERSEY 1044	8052	A-1 SALT	Nov-93	ACTIVE	PART 625, CLASS III	43.83950	-85.36190	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26	21-133-00397-70-00	397	KALIUM HERSEY 1032	8018	A-1 SALT	Nov-94	ACTIVE	PART 625, CLASS III	43.83930	-85.36180	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26	21-133-00383-70-00	383	KALIUM 2031	8010	A-1 SALT	Mar-85	ACTIVE	PART 625, CLASS III	43.83330	-85.35920	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26	21-133-00366-70-00	366	KALIUM 1041	7951	A-1 EVAPORITE	May-90	ACTIVE	PART 625, CLASS III	43.84020	-85.36190	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26	21-133-00409-70-00	409	KALIUM HERSEY 2062	7950	A-1 SALT	Aug-96	ACTIVE	PART 625, CLASS III	43.83300	-85.35920	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26	21-133-00380-70-00	380	KALIUM 1051	7890	A-1 SALT	May-85	ACTIVE	PART 625, CLASS III	43.83990	-85.36190	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26	21-133-00387-70-00	387	KALIUM HERSEY 1054	7876	A-1 SALT	Aug-93	ACTIVE	PART 625, CLASS III	43.83980	-85.36190	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26	21-133-00403-70-00	403	KALIUM HERSEY 1014	7865	A-1 SALT	Jul-95	ACTIVE	PART 625, CLASS III	43.83920	-85.36180	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26	21-133-00438-70-00	438	KALIUM HERSEY 2082	7812	A-1 SALT	Jun-07	ACTIVE	PART 625, CLASS III	43.83270	-85.35920	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26	21-133-00408-70-00	408	KALIUM HERSEY 2032	7810	A-1 SALT	Jul-96	ACTIVE	PART 625, CLASS III	43.83340	-85.35920	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26	21-133-00385-70-00	385	KALIUM HERSEY 1013	7595	A-1 SALT	May-92	ACTIVE	PART 625, CLASS III	43.83960	-85.36190	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26	21-133-00347-70-00	347	KALIUM 1012	7285	A-1 EVAPORITE	Jan-85	ACTIVE	PART 625, CLASS III	43.84050	-85.36190	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC

Figure B4 shows all established Class III *AREA* Injection Permit No. MI-133-3G-A0002 (Yellow Cross Hatch) and Active and Inactive Class III Injection Wells. The AOR has undergone extensive prior regulatory review provided the pre-established injection activity within the AOR.

C.4 Tabulation of Well Data for all Abandoned Wells, Plugged Wells, and Dry Holes

Records of abandoned wells, plugged wells, and dry holes in the state of Michigan are maintained by the MDEQ and the Geological Survey Division. Well permits, completions, and plugging records filed with this agency are maintained by county, township, range, and section number. Locations of wells were searched in the following AOR sections:

The following is a list of wells found within or near to the AOR, and wells in the proximity of the AOR.

This list matches that submitted for Class I Non-Hazardous Review; MI-133-1I-0004, MI-133-1I-0005 and MI-133-1I-0006, submitted January 16, 2015 by Michigan Potash Operating. Wells and rows in BLUE and marked with an asterisk are not in the AOR, but are in proximity of the AOR.

TRS	API Number	Permit Number	Well Name and Number	Total Depth	Formation at Total Depth	Drill Date	Well Status	Well Type	WH_Lat	WH_Long	Operator Name
17N-9W-36	21-133-3611-00-000	36110	THOMPSON 3-36	8366	CINCINNATIAN	Oct-82	INACTIVE	NATURAL GAS WELL	43.82030	-85.33110	Marathon Oil Co.
17N-9W-36	21-133-36068-00-00	36068	BABCOCK ET AL 1-36	8200	CABOT HEAD	Sep-83	INACTIVE	NATURAL GAS WELL	43.82650	-85.32720	Marathon Oil Co.
17N-9W-36	21-133-36925-00-00	36925	BALDINO 1-36	8200	CABOT HEAD	Sep-83	INACTIVE	NATURAL GAS WELL	43.82030	-85.34100	Marathon Oil Company
17N-9W-36	21-133-36991-00-00	36991	HODGES ET AL 1-36	8198	CLINTON	Oct-83	INACTIVE	DRY HOLE	43.81520	-85.32940	Marathon Oil Co.
17N-9W-36	21-133-26888-00-00	26888	GREIN, DONALD 1	1649	BROWN LIMESTONE	Aug-67	INACTIVE	DRY HOLE	43.82250	-85.33560	Consumers Energy Company
17N-9W-36	21-133-31089-00-00	31089	THOMPSON, DON; HODGES, FRANK; SMITH, RALPH 2-36	1616	MICHIGAN STRAY	Jul-76	INACTIVE	NATURAL GAS WELL	43.81860	-85.33010	Mutch Harry L
17N-9W-36	21-133-30537-00-00	30537	THOMPSON, DON; HODGES, FRANK; SMITH, RALPH 1-36	1602	MARSHALL	Nov-75	INACTIVE	NATURAL GAS WELL	43.81830	-85.32990	Mutch Harry L
17N-9W-36	21-133-2871-00-000	28710	THOMPSON & RANDOLPH 1	1586	MICHIGAN STRAY	Dec-71	INACTIVE	NATURAL GAS WELL	43.81820	-85.33940	Mutch Harry L
17N-9W-36	21-133-28710-01-00	28710	THOMPSON & RANDOLPH 1	1586	MICHIGAN STRAY	Dec-71	INACTIVE	NATURAL GAS WELL	43.81820	-85.33940	Mutch Harry L
17N-9W-36	21-133-28498-01-00	28498	GREIN, DONALD 1	1539	MICHIGAN STRAY	Aug-71	INACTIVE	NATURAL GAS WELL	43.82520	-85.33920	Hersey Oil and Gas Co.
17N-9W-36	21-133-28498-00-00	28498	GREIN, DONALD 1	1526	MICHIGAN STRAY	Aug-71	INACTIVE	NATURAL GAS WELL	43.82520	-85.33920	Hersey Oil and Gas Co.
17N-9W-36	21-133-28365-00-00	28365	THOMPSON, EDITH 1	1518	MICHIGAN STRAY	Jun-71	INACTIVE	NATURAL GAS WELL	43.82530	-85.32950	Mutch Harry L
17N-9W-35	21-133-36627-00-00	36627	STATE HERSEY 1-35			Apr-83	INACTIVE	LOCATION	43.81670	-85.35090	Rovsek Aldolph E and Muskegon Development Company
17N-9W-35	21-133-36355-00-00	36355	STATE HERSEY 2-35	8310	CINCINNATIAN	Jan-83	INACTIVE	DRY HOLE	43.82030	-85.36040	Marathon Oil Co.
17N-9W-35	21-133-38748-00-00	38748	GREIN 1-35	8206	CABOT HEAD	Jun-85	INACTIVE	NATURAL GAS WELL	43.82380	-85.34600	Marathon Oil
17N-9W-35	21-133-28888-00-00	28888	RANDOLPH & PAINE & THIEL UNIT 1	1655	MICHIGAN STRAY	Jul-72	INACTIVE	DRY HOLE	43.82500	-85.35920	Mutch J O
17N-9W-35	21-133-28786-00-00	28786	GREIN, DONALD & PAINE, HENRY 1	1638	MICHIGAN STRAY	Mar-72	INACTIVE	NATURAL GAS WELL	43.82510	-85.34900	Hersey Oil and Gas Co.
17N-9W-26	21-133-37519-00-00	37519	MILLER 1-25	8425	CABOT HEAD	Aug-84	INACTIVE	NATURAL GAS WELL	43.83340	-85.34630	Marathon Oil Co.
17N-9W-26	21-133-36942-00-00	36942	WOODWARD ET AL 1-26	8135	CABOT HEAD	Oct-83	INACTIVE	DRY HOLE	43.83460	-85.35680	PPG Oil and Gas Company, Inc.
17N-9W-26*	21-133-00378-70-00	378	KALIUM 1042*	8116	A-1 SALT	Feb-85	INACTIVE	PART 625, CLASS III	43.84010	-85.36190	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC

TRS	API Number	Permit Number	Well Name and Number	Total Depth	Formation at Total Depth	Drill Date	Well Status	Well Type	WH_Lat	WH_Long	Operator Name
17N-9W-26*	21-133-366-00-0000	36600	THOMAS 1-26*	8085	CABOT HEAD	Jan-84	INACTIVE	DRY HOLE	43.84180	-85.36110	PPG Oil and Gas Company, Inc.
17N-9W-26*	21-133-00379-70-00	379	KALIUM 1052*	8045	A-1 SALT	Mar-85	INACTIVE	PART 625, CLASS III	43.83980	-85.36190	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26*	21-133-00394-70-00	394	KALIUM HERSEY 1031*	7973	A-1 SALT	Oct-94	INACTIVE	PART 625, CLASS III	43.83940	-85.36180	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26*	21-133-00448-70-00	448	KALIUM HERSEY 2041*	7941	A-1 SALT	Jun-00	INACTIVE	PART 625, CLASS III	43.83320	-85.35910	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26*	21-133-00348-70-00	348	KALIUM 1011*	7827	A-1 EVAPORITE	Nov-84	INACTIVE	PART 625, CLASS III	43.84050	-85.36150	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26*	21-133-00437-70-00	437	KALIUM HERSEY 2081*	7811	A-1 SALT	Jun-07	INACTIVE	PART 625, CLASS III	43.83270	-85.35920	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26*	21-133-00381-70-00	381	KALIUM 1031*	4800	A-1 SALT	Feb-92	INACTIVE	PART 625, CLASS III	43.83960	-85.36190	Mosaic USA LLC, DBA Mosaic Potash Hersey, LLC
17N-9W-26	21-133-28635-00-00	28635	PAINE, HENRY 1	1558	MICHIGAN STRAY	Nov-71	INACTIVE	NATURAL GAS WELL	43.83240	-85.34940	Mutch Harry L
17N-9W-25	21-133-30341-00-00	30341	MILLER, DOUGLAS & THIEL, HAULDAH 1-25	1561	BROWN LIMESTONE	Aug-75	INACTIVE	DRY HOLE	43.83190	-85.33920	Mutch Harry L
17N-9W-25	21-133-30384-00-00	30384	JOHNSON, WALT & MILLER, DOUG & THIEL, H 1-25	1529	MICHIGAN STRAY	Aug-75	INACTIVE	DRY HOLE	43.83260	-85.32860	Mutch J O
17N-9W-25	21-133-12066-00-00	12066	JOHNSON-CODY ET AL COMM. 1	1520	MARSHALL	Jan-46	INACTIVE	DRY HOLE	43.83920	-85.32970	Oryx Energy Co. and Carter Oil Co.
17N-8W-32	21-133-27307-00-00	27307	MANEY, NORMAN 1	1660	MARSHALL	Jul-68	INACTIVE	DRY HOLE	43.82230	-85.30490	Consumer Power and Michigan Consolidated Gas
17N-8W-31	21-133-34558-00-00	34558	FREUDENBURG 1-31	10858	PRAIRIE DU CHIEN	Jul-81	INACTIVE	DRY HOLE	43.82650	-85.30830	JEM Petroleum Corp.
17N-8W-31	21-133-358-00-0000	35800	GRAY 1-31	9769	PRAIRIE DU CHIEN	Aug-82	INACTIVE	NATURAL GAS WELL	43.82750	-85.32240	Marathon Oil Co.
17N-8W-31	21-133-36336-00-00	36336	PARK 1-31	8216	CLINTON	Feb-84	INACTIVE	DRY HOLE	43.82030	-85.32200	Marathon Oil Co.
17N-8W-31	21-133-34558-01-00	34852	FREUDENBURG 1-31A	8183	DUNDEE	Aug-81	INACTIVE	DRY HOLE	43.82650	-85.30830	JEM Petroleum Corp.
17N-8W-31	21-133-31786-00-00	31786	KNAPP, GERALD & PARKS, ROBERT 1-31	1590	MICHIGAN STRAY	Sep-77	INACTIVE	NATURAL GAS WELL	43.81800	-85.32000	Hersey Oil and Gas Co.
17N-8W-30	21-133-35977-00-00	35977	WARK 1-30	8371	CINCINNATIAN	Sep-82	INACTIVE	DRY HOLE	43.84210	-85.31280	Willmet Inc.
17N-8W-30	21-133-33466-00-00	33466	MANEY, NORMAN 1-30	5080	AMHERSTBURG	Feb-80	INACTIVE	DRY HOLE	43.83470	-85.31960	Dart Oil and Gas Co.
17N-8W-30	21-133-27159-00-00	27159	MADDERN, H 1	4030	DUNDEE	Feb-68	INACTIVE	DRY HOLE	43.83330	-85.31260	Madlou Inc.
17N-8W-19	21-133-38463-00-00	38463	VUKIN UNIT 1-19	8385	CINCINNATIAN	Feb-85	INACTIVE	DRY HOLE	43.84400	-85.31480	PPG Oil and Gas Company, Inc. and Amoco Production Co.
17N-8W-19	21-133-38463-70-00	5006	VUKIN UNIT 1-19	8385		Dec-84	INACTIVE	DRY HOLE	43.84400	-85.31480	PPG Oil and Gas Company, Inc. and Amoco Production Co.
16N-9W-2*	21-107-37188-00-00	37188	JENSEN 1-2*	8085	CABOT HEAD	Nov-83	INACTIVE	DRY HOLE	43.80730	-85.34550	Marathon Oil Co.
16N-9W-12	21-107-00340-70-00	340	PILARSKI 1-12	8318	CINCINNATIAN	Aug-84	INACTIVE	DRY HOLE	43.79740	-85.32660	PPG Industries, Inc.
16N-9W-12*	21-107-36283-00-00	36283	PARK 1-12*	8215	CINCINNATIAN	Jan-83	INACTIVE	DRY HOLE	43.79800	-85.34090	Willmet Inc.

TRS	API Number	Permit Number	Well Name and Number	Total Depth	Formation at Total Depth	Drill Date	Well Status	Well Type	WH_Lat	WH_Long	Operator Name
16N-9W-11	21-107-00339-70-00	339	WARD 1-11*	8121	CINCINNATIAN	Aug-84	INACTIVE	DRY HOLE	43.79010	-85.34660	PPG Industries, Inc.
16N-9W-1	21-107-00377-70-00	377	JOHNSON 2-1	8085	A-1 SALT	Apr-84	INACTIVE	DRY HOLE	43.80980	-85.32910	PPG Industries, Inc.
16N-9W-1	21-107-00337-70-00	337	JOHNSON 3-1	8073	A-1 EVAPORITE	May-84	INACTIVE	DRY HOLE	43.80980	-85.32900	PPG Industries, Inc.
16N-8W-7	21-107-36187-00-00	36187	STEIN 1-7	8380	CINCINNATIAN	Nov-82	INACTIVE	DRY HOLE	43.79110	-85.31200	Willmet Inc.
16N-8W-6	21-107-36067-00-00	36067	JOHNSON ET AL 1-6	8386	CINCINNATIAN	Oct-82	INACTIVE	DRY HOLE	43.80570	-85.32200	Marathon Oil Co.
16N-8W-6	21-107-30728-00-00	30728	MCLACHLAN, GEORGE 1-6	1670	MICHIGAN STRAY	May-76	INACTIVE	DRY HOLE	43.80330	-85.31010	Mutch Harry L
16N-8W-6	21-107-30654-00-00	30654	KNAPP, GERALD & JOHNSON, DON 1-6	1610	MICHIGAN STRAY	Dec-75	INACTIVE	NATURAL GAS WELL	43.81090	-85.31980	Mutch Harry L
16N-8W-18*	21-107-3689-00-000	36890	STEIN 1-18*	8264	CINCINNATIAN	Aug-83	INACTIVE	DRY HOLE	43.77650	-85.30740	PPG Oil and Gas Company, Inc.

Figure B5 shows all plugged wells, shallow or deep within the area of review. Total depths of the each well is listed next to its well symbol. Also shown on this map are the API Serial number. The serial number is illustrated below:

State	–	County	–	**Serial**	–	Completion
21	-	133	-	#####	-	00-00

Mineral wells available to the public record or made known to the applicant are also shown. These wells are preceded with the letter "M" before the listed Serial No. The State of Michigan has adapted a 'pseudo API No,' utilizing the mineral permit number as an API Serial No. As an example; M4999 would have the equivalent Mineral Well API designation of :

State	–	County	–	**Serial**	–	Completion
21	-	133	-	0**4999**	-	**70**-00

These numbers can be quickly cross referenced with public records, and or the tabular section above.

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C.5 Tabulation of Well Data for the Location of all Water Wells of Public Record or otherwise known to the Applicant within the AOR or within a quarter mile of the Facility Property Boundary, whichever is greater

The area of investigation is ¼ mile around the entire AOR, which is greater than the quarter mile boundary from the proposed initial facility property boundary. Therefore a list of all Water Wells within the Area of Review have been cataloged and presented here.

Water well records for the State of Michigan are maintained by the MDEQ. The filing system used is referenced by section, township, and range. In 2003, The Michigan Groundwater Mapping Project was mandated by Public Act 148 of 2003, which requires that a groundwater inventory and map be generated for the state. Funding was provided by the State of Michigan through cooperative agreement with the U.S. Geological Survey (USGS) and the MSU Institute of Water Research. A comprehensive list of wells and pump test data has been carefully cataloged via this effort. http://gwmap.rsgis.msu.edu//.

A total of 43 freshwater wells are located in the AOR. The deepest well is 215 feet deep. The shallowest well is 30 feet deep (See Figure D2).

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C.5 Tabulation of Well Data for the Location of all Water Wells of Public Record or otherwise known to the Applicant within the AOR or within a quarter mile of the Facility Property Boundary, whichever is greater

TRS	Well/Permit Number	Owner Name	Well NO.	Total Depth	Build Date	Surf Lat	Surf Lon	Well Type	Scrn Top	Scrn Btm
16N-09W-12	54000000716	PILARSKI, DANIEL		92		43.7988837	-85.3266602	HOSHLD	88	92
16N-08W-6	54000003335	Dan Gray	5402884	196	1/29/2004	43.8005679	-85.3170481	HOSHLD	192	196
16N-08W-6	54000004020	LORRIE BLANCHARD	5404467	143	10/5/2004	43.8074394	-85.3089524	HOSHLD	138	143
16N-08W-7	54000004642	DEAN FEAR HEILEY	5405371	63	6/4/2004	43.7977537	-85.3078294	HOSHLD	58	63
16N-08W-7	54000005000	CINDY MANEKE	5405756	144	12/14/2006	43.7996079	-85.3169681	HOSHLD	139	144
16N-08W-7	54000005160	SCHAFOUR BUILDERS	5406053	135	10/9/2007	43.7906877	-85.323338	HOSHLD	130	135
16N-08W-7	54000005288	LONNIE WALTERS	5406089	78	9/11/2007	43.7960176	-85.3069184	HOSHLD	73	78
17N-08W-19	67000000343	VUKIN, NICK		120	6/20/1983	43.8461724	-85.3159985	HOSHLD	116	120
17N-08W-19	67000000344	AMOCO PRODUCTION CO.		50	12/8/1984	43.8435876	-85.3156298	UNK	45	50
17N-08W-29	67000000395	HICKS, BILL		71	9/6/1983	43.8360886	-85.3047778	HOSHLD	67	71
17N-08W-30	67000000399	ELDER, BRIAN		40	8/28/1982	43.8427772	-85.3093684	HOSHLD	36	40
17N-08W-30	67000000400	EVANS, DAVID		140	8/11/1980	43.8418913	-85.3169278	HOSHLD	136	140
17N-08W-30	67000000401	ERBIN, CASS		150	8/14/1993	43.842724	-85.3241466	HOSHLD	145	150
17N-08W-31	67000000402	BAILEY, BRUCE		56	7/5/1986	43.8172686	-85.3079978	HOSHLD	51.5	55.5
17N-08W-31	67000000403	BAILEY, GEORGE		133	6/13/1995	43.8234404	-85.3067348	HOSHLD	129	133
17N-08W-32	67000000404	SILER, KENNETH		30	8/15/1972	43.8241873	-85.305014	HOSHLD	26	30
17N-09W-23	67000000643	GINDER, MARTIN		58	8/30/1973	43.843256	-85.3469597	HOSHLD	54	58
17N-09W-25	67000000649	JOHNSON, ROBERT		56	4/15/1968	43.8376963	-85.325921	HOSHLD	52	56
17N-09W-25	67000000650	MENEZES, MARCO		57	8/29/1984	43.8404848	-85.3332011	HOSHLD	53	57
17N-09W-25	67000000651	FORD, KEN		40	8/24/1978	43.8341705	-85.3251415	HOSHLD	36	40
17N-09W-25	67000000652	REICHOW, DEAN		58	12/15/1982	43.8356404	-85.3248276	HOSHLD	54	58
17N-09W-25	67000000653	WALKER, JACOB		102	11/8/1977	43.8426547	-85.3289759	HOSHLD	98	102
17N-09W-35	67000000754	EICHENBERG, JIM		158	7/20/1985	43.8180688	-85.3461282	HOSHLD	154	158
17N-09W-35	67000000756	WING, ROCKNEY L.		145	7/14/1990	43.8208441	-85.3544604	HOSHLD	140	145
17N-09W-36	67000000759	BABCOCK, JIM		39	9/1/1970	43.8263783	-85.3248011	HOSHLD	35	39
17N-09W-36	67000000760	HODGES, FRANK		108	5/10/1971	43.8162701	-85.3249717	HOSHLD	100	108
17N-09W-34	67000004761	JOIE LEFAVE	03-335	165	10/27/2003	43.8233462	-85.3665541	HOSHLD	160	165

TRS	Well/Permit Number	Owner Name	Well NO.	Total Depth	Build Date	Surf Lat	Surf Lon	Well Type	Scrn Top	Scrn Btm
17N-09W-35	67000004798	JOIE LAFEVE	03-335	165	10/27/2003	43.823257	-85.3466597	HOSHLD	160	165
17N-08W-31	67000004922	RONALD FREUDENBURG	04-105	50	5/26/2004	43.8283187	-85.3067418	HOSHLD	40	50
17N-09W-35	67000005237	WILLIAM J BOHLEN	1278	143	9/21/2001	43.823257	-85.3466597	HOSHLD	138	143
17N-08W-30	67000005466	ROBERT DAVEY	01-215	121	6/21/2001	43.8412522	-85.3139505	HOSHLD	116	121
17N-08W-30	67000005468	CHARLES T SMITH	02-059	170	4/5/2002	43.8411392	-85.3162864	HOSHLD	160	170
17N-08W-31	67000005469	SCOTT E HENRY	01-235	196	12/15/2001	43.8197966	-85.3227466	HOSHLD	191	196
17N-09W-35	67000005557	ROCKNEY L WING SR	05-155	162	6/23/2005	43.821033	-85.3539606	HOSHLD	157	162
17N-09W-36	67000006030	MARY BRININSTOOL	06-083	144	10/10/2006	43.8210488	-85.3349372	HOSHLD	138	144
17N-09W-36	67000006107	SAM SIMMON	06-302	106	12/28/2006	43.8215508	-85.3342892	HOSHLD	101	106
17N-09W-35	67000006302	TRENTON & TAMMY LIVEMORE	07-092	183	8/3/2007	43.821059	-85.3547965	HOSHLD	178	183
17N-09W-25	67000006424	MATTHEW & MAGGIE WALCOTT	07-249	139	10/10/2007	43.8373093	-85.3324169	HOSHLD	134	139
17N-08W-32	67000006609	KENNETH POSTEMA & TRUST	08-216	150	11/3/2008	43.8259186	-85.305398	HOSHLD	145	150
17N-08W-30	67000006622	Burwell Mackall	09-131	39	11/24/2009	43.8410493	-85.3239672	HOSHLD	34	39
17N-09W-36	67000006806	Elvis Peacock	11-050	215	7/13/2011	43.8283889	-85.3246374	HOSHLD	211	215
17N-08W-29	67000006974	R. Kevin Reynolds	JBES8Y 2LA3	160	7/3/2013	43.8321988	-85.3043379	HOSHLD	150	160
17N-09W-36	67000007021	ROY HENDERSON	45	215	5/25/2011	43.8223789	-85.338747	HOSHLD	205	215

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C.6 Corrective Action Plan for inadequately plugged wells in the AOR which penetrate the top of the confining zone

All available data and records were amalgamated by comprehensive inquiries by Michigan Potash Operating, to the Michigan Geological Survey, the Michigan Department of Natural Resources, and the Michigan Department of Environmental Quality, and Western Michigan University's Michigan Geological Repository for Research and Education.

Well records for all known wells drilled within the AOR have been comprehensively re-reviewed by an independent third party: the Michigan Geological Survey, and Michigan Geological Repository for Research and Education.

The Michigan Geological Survey prepared wellbore diagrams and compiled the plugging records and well histories for review by the EPA, attached here for all wells in the AOR; and can be referenced hereafter.

Well histories are accompanied by all supporting documentation. It is clear that there are no wells that have been inadequately plugged and abandoned. The supporting documentation has been included with each well that penetrates deeper than the Dundee formation and the confining layers above.

Shallow wells not penetrating any confining layer, typically targeting shallow gas in the Michigan Stray formation at approximately 1800' sub-surface, have not had wellbore diagrams drawn, although their histories have been reviewed.

All wells within the AOR have been thoroughly reviewed and re-reviewed under numerous permits, and re-permitting processes under Part 625 Class III, EPA Area Permit No. MI-133-3G-A0002, and Part 625 Class I, EPA Area Permit Nos. MI-133-1I-0002 and MI-133-1I-0001. The wells may be re-reviewed concurrently with Class I Non Hazardous Application MI-133-1I-0004, MI-133-1I-0005 and MI-133-1I-0006.

No new wells have been drilled in the AOR since 2000 or earlier, prior to the last permit re-review for Class I Non Hazardous Permits No. MI-133-1I-0002 and MI-133-1I-0001.

No wells have been historically identified as improperly completed, or plugged and abandoned. The independent re-review by Michigan Potash Operating corroborates.

No wells have been identified as a potential cause of threat to any USDW.

A re-review has revealed historically adequate protection of all USDWs and no compromise of the confining or injection zones.

The well drilled within the AOR fall into three distinct categories:

- Depth range 1,500 - 1,800 feet - Wells seeking gas in the Michigan Stray sand.
- Depth range 4,000 - 5,100 feet - Exploratory wells seeking oil and gas in the Dundee, Reed City, and Detroit River strata.
- Depth range 7,900 - 10,900 feet - Wells to evaluate A-1 Evaporate potash deposits and to test for natural gas, particularly targeting the Clinton and Burnt Bluff.

The casing, casing cementing and plugging records have been examined in detail for all wells which penetrate the proposed injection horizons within the AOR.

Therefore, no corrective action plan is required because there are no records indicating any wellbores in the AOR penetrate the confining or injection zone that have not been properly plugged and abandoned.

In the unlikely event that some unforeseen failure of any of the injection wells occur which might jeopardize any USDW:

1. Immediately halt operations of the well.
2. Notify appropriate regulatory authorities of the discovery and nature of the well failure (telephone notification within 24 hours; written confirmation within 5 days), as per CFR 40 144.28.
3. Conduct an investigation into the cause of the well failure; develop corrective action plan to eliminate the problem.
4. Perform necessary remedial work.

C.7 List of Names and Addresses of all Owners of Record of Land within a Quarter Mile of the Facility Boundary, unless waived by the Director

The following list was compiled from land owner records available in Osceola and Mecosta Counties, including tax rolls, plat books, and register of deeds. This includes all owners within ¼ mile of the centrally located in the SW/4 NW/4 NW/4 Section 31 17N R8W, as pictured in Figure B1.

Name	Address
Frank and Rosalie Hodges	510 120th Ave, Hersey, MI 49639
Dale and Jacquelun Bailey	11427 1 Mile Rd, Evart, MI 49631
Randy Morse	5610 Wembley Court, Clarkston, MI 48346
Betty Park	12950 23 Mile Road, Hersey, MI 49639
Aaron and Kyle Maney	1411 115th Ave, Evart, MI 49631
Scott and Brenda Henry	968 120th Ave, Evart, MI 49631
Robert and Sandra Keller	1381 120th Ave, Hersey, MI 49639
Double ZS Ranch, LLC	900 Monroe Ave, NW, Grand Rapids, MI 49503
Samuel Simmon	11218 Dexter Trail, Westphalia, MI 48894
Mary Brininstool	PO Box 1007, Evart, MI 49631
Dreux Benoit & Elaine Benoit	4965 Kennedy Drive, Hudsonville, MI 48426
Jimmy and Caralynn Babcock	785 120th Ave, Hersey, MI 49639
Chance and Shilo Cook	701 120th Ave, Hersey, MI 49639
Micheal and Janice Reske	683 120th Ave, Hersey, MI 49639

C.8 A Description of the Methods Used to Locate Wells in the AOR

A comprehensive list of wells, including oil and gas wells, groundwater wells, hydrogeological stratigraphy wells, minerals wells, and injection wells were amalgamated as per the following databases:
Oil and gas wells: _IHS Well Data
http://ww2.deq.state.mi.us/GeoWebFace/
Mineral Wells: Michigan Mineral Well Database
http://ww2.deq.state.mi.us/GeoWebFace/
http://gwmap.rsgis.msu.edu//.
http://www. zipcodemapping.com/ez/4993 9.html
http: //www. deq. state.mi.us/part201ss
http:/lwww.deu.state.mi.us/wdspi
http://www.epa.Rov/superftind/sites/npl/rai.htm
http://www.epa. gov/reRion5/waterluic/cUsites.htm
http ://ww2. deq . state. mi.us/mir/
http:/lwww.dnr.state.mi.us/spatialdatalibrary/pdf_maps/mineral_lease_information/osceola lease information.pdf
http://www.dnr.state.mi.us/spatialdataiibrary/pdf_maps/mineral_lease_information/mecosta lease information.pdf
http://www. deq. state. mi.us/well-logs/

Comprehensive Freedom of Information Act Request for prior applications and reviews: Michigan Department of Environmental Quality and Department of Natural Resources, EPA Region V, UIC Division Core and database reviews from the Michigan Geological Repository for Research and Education

Studies of the Precambrian Michigan Basin, Michigan Basin Geological Society, 1969 Hydrological Atlas of Michigan, Western Michigan University, Department of Geology, 1981

US EPA UIC PERMIT APPLICATION FORM 7520-6

Sodium and Potassium

CLASS III

ATTACHMENT D: MAPS AND CROSS SECTION OF USDWs

THE UNITED STATES POTASH PROJECT
APRIL 2015

ATTACHEMENT D
MAPS AND CROSS-SECTIONS OF USDW

EPA instruction, form 7520-6 (2011):

MAPS AND CROSS SECTION OF USDWs -Submit maps and cross sections indicating the vertical limits of all underground sources of drinking water within the area of review (both vertical and lateral limits for Class I), their position relative to the injection formation and the direction of water movement, where known, in every underground source of drinking water which may be affected by the proposed injection. (Does not apply to Class II wells.)

D.1 Regional Hydrogeology

The area of the proposed facilities are mantled by glacial drift, the result of multiple glaciations of central Michigan.

The surficial geology in the area is made up of water laid moraine and outwash deposits. The area within the AOR occupies an interlobate position between the Michigan Lobe to the west and the Saginaw and Erie Lobes to the east and south during the final glaciation of Michigan. Glaciofluvial and glaciolacustrine sediments were deposited into the interlobate area and the Muskegon Valley formed the major outlet channel for glacial melt water. Because the major ice flow axes were governed by the major topographic elements of the Great Lakes Region, it is probable that similar ice lobes occupied similar positions during earlier glaciations as well. Thus, the stratigraphic sequence encountered in the surface in the plant area may be expected to have sediments which were deposited in similar interlobate depositional environments during each episode of continental glaciation of North America.

Materials representative of sedimentation in several different depositional environments have been identified within the AOR. These include: 1) till - sediment deposited directly from a glacier by lodgment or melt out and without subsequent re-sedimentation by melt water; 2) stagnant ice deposits - sediment deposited in an ice marginal environment where the ice is relatively immobile; 3) glaciolacustrine deposits - sediment deposited in ice marginal glacial 'lakes under relatively low energy conditions; and 4) glaciofluvial deposits - sediment deposited in an ice marginal environment under relatively high energy conditions.

D.2 Local (AOR) Hydrogeology

Bedrock is identified as Jurassic age ‘red-beds,’ the deepest of which occurs at approximately 650’ below ground level.

According to the Geologic Atlas of Michigan compiled by the Department of Geology, Western Michigan University in 1981, red beds of Jurassic age should be encountered at the bedrock surface. All of the test holes which penetrated the bedrock surface have encountered red sandstone and siltstone inter-bedded with gypsum.

The "red bed" sequence made up of red sandstone and siltstone inter-bedded with anhydrite of Jurassic age, forms the uppermost bedrock formation encountered in the AOR. The greatest depth at which potable water can be obtained is considered to be the bedrock surface (base of the glacial till).

The base of groundwater exploration, that is, the greatest depth at which potable groundwater can be obtained, has been determined to be the bedrock surface. Historically, all of the water-bearing zones

tested in the AOR, at the bedrock surface or below yield saline water, with greater than > 35,000 mg/L concentration, (Hydrogeology of Part of Osceola and Mecosta Counties, Michigan, W.A. Menley 3/1985).

Between 1983 and 1989, over 308 hydrological test holes and approximately 60 piezometers cataloging over 33,833 feet of groundwater and soil data was amalgamated for the purposes of adequately understanding and protecting groundwater within the Michigan Potash Operating AOR. The area has been extensively studied from 1983 to 1989 for the sole purpose of hydrological investigation. These test holes and all the associated data has been comprehensively reviewed by the applicant and the data incorporated herein.

- **Figure D1** is a stratigraphic column describing the glacial till and sources of USDWs and the source of USDWs as extensively mapped and defined by W.A. Menley between 1983 and 1989. Glacial Deposits are highly variable, especially closer to ground level. Depths approximate those encountered throughout the AOR.

A detailed description of each hydrological and potential USDW follows Figure D1.

Stratigrafic Column and Nomenclature of the Hydrological Units in the AOR, as Defined by W.A. Menley

K			Valley train outwash	Sand and gravel coarsening upward, fine to v-coarse sand, pebbles and cobbles, locally cemented, typical of a high energy glacio-fluvial environment.	~ 0'-60' Below GL
J			Glaciolacustrine	Clay and silty clay, laminated to bedded, some interbeds of silt, massive silty sandy clay with pebbles common, typical of a low energy glacio-fluvial environment	~ 0'-60' Below GL
H			Stagnant ice/outwash	Silty sandy clay, some pebbles, in part stratified, typical of a stagnant ice depositional environment	~ 0'-60' Below GL
G			Till	Sandy clay till, sparse coarse fraction, typical of a sub glacial depositional environment	~ 0'-60' Below GL
		G/1	Glaciolacustrine	Clay and silty clay, laminated to bedded, some interbeds of silt, massive silty sandy clay with pebbles common.	~ 0'-60' Below GL
F	F/1	F/1/d	Outwash	Medium to coarse sand minor gravel, interbeds of silty clay	~ 60'-220' Below GL
		F/1/c	Glaciolacustrine	Clay and silty clay, laminated to bedded, some interbeds of silt, massive silty sandy clay with pebbles common.	
		F/1/b	Outwash	Medium to coarse sand minor gravel, interbeds of silty clay	
		F/1/a	Glaciolacustrine	Clay and silty clay, laminated to bedded, some interbeds of silt, massive silty sandy clay with pebbles common.	
	Lower F (F/B)		Outwash	Medium to coarse sand, minor silty clay interbeds, minor fine gravel interbeds, K= 650/gpd/sq.ft. Principle USDW when away from surface charge.	~ -80'-220' Below GL
E	Upper E		Stagnant ice	Silty sandy clay, some pebbles, in part stratified	~ 220'-300' Below GL
	E/1		Outwash	Medium to coarse sand minor gravel, interbeds of silty clay, K = 600 gpd/sq.ft, LOWEST USDW.	~ 300'-400' Below GL
D			Till	Sandy clay till, sparse coarse fraction	~ 400-620' Below GL
			BEDROCK	Jurassic Red Beds, >35,000 TDS "BRINE" from here to Center of the Earth	~ 580'-620' Below GL

FIGURE D1. Stratigraphic description of USDW in the AOR.

When in the immediate proximity to surface charge, such as the Muskegon River or a Lake, it is typical to find static water levels at less than 20'-30' Below GL in Units K, J, H, and/or G.

Unit F/1 serves as a plastic clay barrier and confining layer to Unit F. Above sub Unit F/1, perched water tables or unconfined aquifers may be found.

A detailed description of each glacial till deposition feature from shallowest to deepest, is as follows:

Unit K:
Unit K represents the sand and gravel deposits that form the upper part of the alluvial fill along the course of the Muskegon Valley. This unit is well exposed in the Hersey Sand and Gravel pit east of Hersey, located across the Muskegon River. The texture of this unit becomes coarser upward, with coarse clean gravel beds deposited in channels cut into the dominantly sand size overbank deposits. Excellent exposures of these channel sands and overbank deposits can be seen in the high walls of the quarry.

In the gravel pit, the sand and gravel deposits that are being quarried east of 170th Avenue and south of the washing facility are part of older glacio-fluvial deposits that make up Unit F. The sand and gravel deposits west of 170th Avenue and north of the washing plant are part of the alluvial fill along the Muskegon River (Unit K) laid down as part of the outwash deposits during the final de-glaciation of this part of Michigan.

Unit J:
During the final de-glaciation of the study area the Muskegon Valley functioned as a major melt water outlet stream. A melt water valley was incised through the previously deposited Units G and H into Unit F, eroding and removing Sub-Unit F/1 along the course of the Muskegon Valley down to an elevation of about 875 ft. Unit J is made up of fine textured silt and silty clay beds that were deposited in the channel bottom as the channel was in-filled with fine grained alluvial deposits.

Unit H:

Unit H is made up of inter-bedded sand, gravel and till which mantles the hummocky moraine upland in the eastern part of the study area. This unit represents the stagnant ice depositional environment of the final episode of de-glaciation of the study area. Most of the material in Unit H was deposited by melt water on top of stagnant ice. As the ice eventually melted out these materials were re-deposited by slumping and subject to re-sorting by runoff to form the highly variable and complex deposits which form the present land surface in the upland area east and south of the Muskegon River Valley.

Unit G:
Unit G is a silty clay till which is present beneath parts of the hummocky moraine upland east of the Muskegon River deposited during the final glaciation of the study area.

Unit F:
Unit F is a primary aquifer in the AOR. It is a thick sequence of inter-bedded sand and gravel which was encountered in all of the test holes drilled in the study area. Thin interbeds of clay, silty clay and till were encountered within this unit in all test holes. One such interbed has been separately identified as Sub-Unit F/1. The sand and gravel beds are made up mainly of subrounded clasts of igneous, metamorphic and sedimentary rocks. This unit is considered to represent deposition in a high energy glacial outwash environment.

The Muskegon Valley has been incised into Unit F exposing the sand and gravel deposits which have been quarried at the Hersey Sand and Gravel operations east of Hersey. The sand and gravel deposits east of 170th Avenue and south of Hersey Road are part of Unit F.

The hydraulic conductivity of this unit is considered to be about the same as Sub-Unit E/1, that is, k = 600 gpd/ft^2.

The specific yield is considered to be about 0.20. The specific yield is defined as the volume of water released from storage in the aquifer per unit surface area per unit decline of the water table (Freeze and Cherry, 1979, p.61).

The sand beds which overlie Sub-Unit F/1 become finer upward and more silt interbeds are present. A "perched water table" is typically present in the sand overlying Sub-Unit F/1. Similarly, unsaturated sand and gravel beds are typically present beneath Sub-Unit F/1. The presence of unsaturated sands can be detected from the resistivity log. Resistivity values > 100 ohm.ft are considered to be indicative of unsaturated sand and gravel. This interpretation has been verified by comparison of the geophysical logs with the water level in nearby wells and auger holes in which direct observation of the position of the water table can be made.

Sub-Unit F/1:
Sub-Unit F/1 is an extensive layer of plastic silty clay to clayey till that is present throughout the study area except where it has been removed by subsequent erosion along the course of the Muskegon Valley or where its continuity has been disrupted in collapse structures.

The Sub-Unit F/1 is a continuous glacio-lacustrine deposit present within Unit F throughout most of the AOR. It serves as a barrier and confining interval to aquifers below.

The Sub-Unit F/1 is a saturated, plastic, silty clay. The upper part of the clay is indistinctly laminated and mottled pink and gray, grading downward to a drab light gray color. In some test holes, floating sand grains are present in the silty clay, at other locations the texture approaches that of a silty clay till. Sub-Unit F/1 ranges in thickness from about 8 - 15 ft beneath the plant site.

In Section 36, Township 17N, Range 9W, Sub-Unit F/1 thickens to about 70 ft. It is made up of 2 to 3 distinct clay beds separated by sandy till.

In Section 26, Township 17N, Range 9W Sub-Unit F/1 is about 40 ft thick. It is made up of an upper and lower silty clay bed separated by a sandy till layer.

Unit E:
This unit is a complex mixture of inter-bedded sand, gravel, and till, characterized by highly variable resistivity and gamma ray log signatures. It is considered to represent deposition in the marginal region of a stagnant continental glacier.

Sub-Unit E/1:
Sub Unit E/1 is a principle aquifer in the AOR. This unit is present at the base of Unit E throughout the AOR. It is made up of sand and gravel which is considered to have been deposited in a high energy outwash environment. ***It is the lowermost aquifer present above the base of groundwater exploration.***

Due to the number of accessible sources of ground water above the Sub-Unit E-1, at shallower depths, it is not used as a common source of household water.

Prior to 1984, there was not a well completed in this interval. In 1984, the PPG Bass 84-06 was completed as an observation well in Sub-Unit E/1. This well provided the first information about the aquifer coefficients of Sub-Unit E/1 as well as the hydraulic head and water quality because there were no existing water wells completed in this aquifer in the AOR.

In November of 1984 a short duration pumping test was run to estimate the transmissivity of Sub-Unit E/1.

The test was conducted at a rate of 27 US gpm for 2 hrs, followed by a 40 minute recovery test, with a determinate Transmissivity$_a$ = T_a = 36,000 gpd/ft, and k = T/m = 36,000/60 = 600 gpd/ft^2

The water analysis from PPG Bass 84-06 was determined on a water sample collected January 16, 1985. The results are included in Appendix B. The water is a calcium-sulphate/bicarbonate water having a concentration of about 730 mg/L and a specific conductance of 1,025 micro ohms/cm @ 25°C. The total hardness of the water is about 463 mg/L as $CaCO_3$.

Unit D

Unit D is glacial till which was encountered overlying the bedrock surface or Unit A throughout the study area. It is a reddish brown to pinkish gray, calcareous sandy till which has very uniform geophysical log characteristics. Unit D represents sedimentation in a glacial depositional environment, either as lodgment till or as till deposited by basal melting of a stagnant ice sheet.

80.00% of all water wells in the area are 200' or shallower. Industrial use is preferentially taken to deeper horizons, so as to access water that is not being drawn by household or agricultural use.

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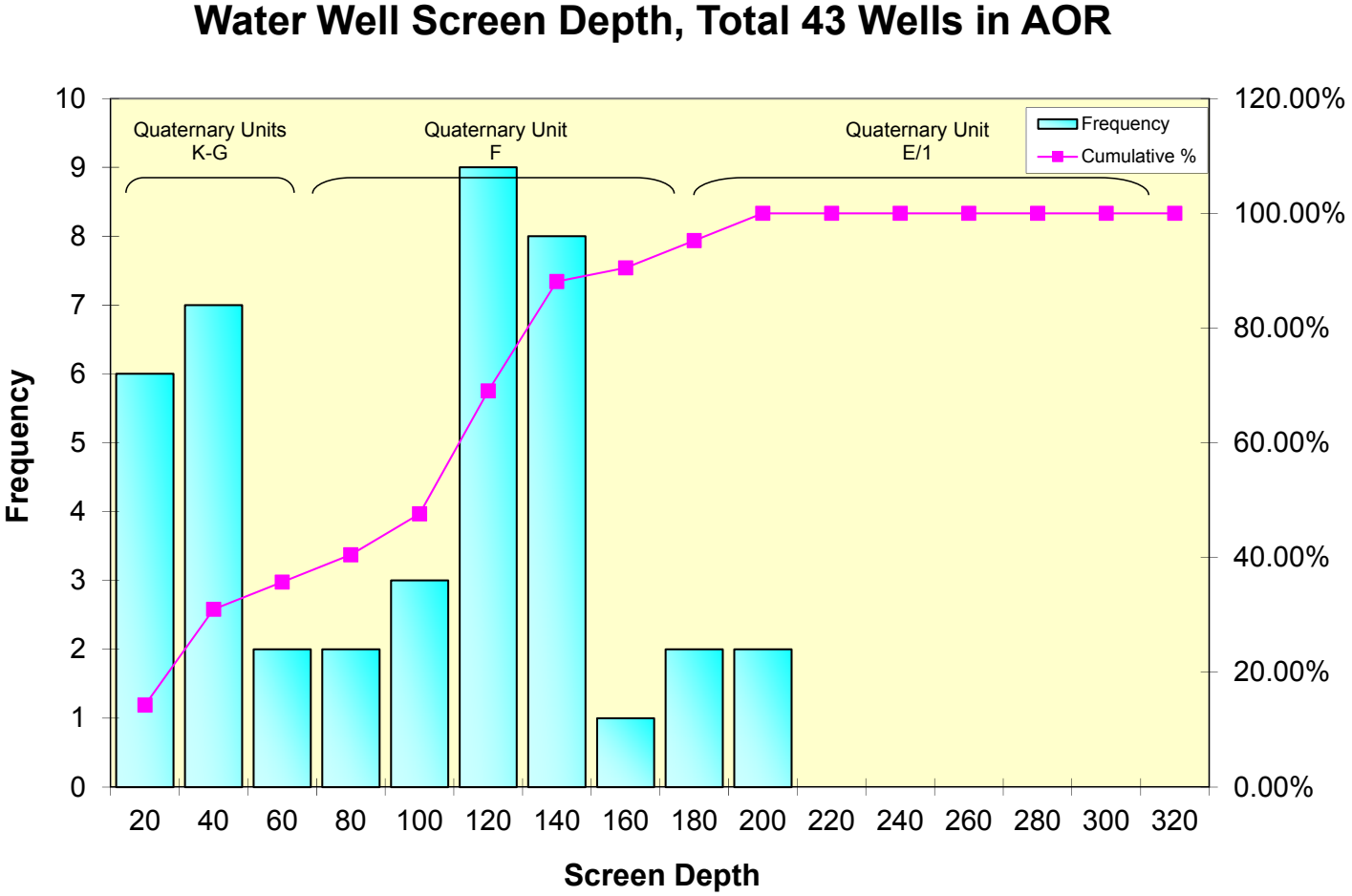


Figure D2. (Above) A cumulative histogram showing the producing depths of all water wells within the AOR. The depths listed here are depths below ground level. The principle zone of household use are the shallow K,G units and the Quaternary Unit F.

While the deepest screen completion depth within the AOR is no greater than 200' below ground level, another 200' of glacial till and potential sources of water with less than 10,000 TDS occurs until the Jurassic Redbeds. A wider sampling area, will show groundwater utilization in the Quaternary Unit E/1 for industrial purposes.

The lower most glacial till Unit D, is a clayly, silty, confining layer with minimal to no vertical permeability. Blow Unit D, observed TDS is greater than 35,000 in the Jurassic Redbeds. This is likely due to the increasing concentration of anhydrite and gypsum deposition as depths are increased.

In fact, the E/1 unit, which is principally utilized for industrial purposes, is a calcium sulfate (CaSO4) based water as described by W.A. Menley. CaSO4 is the principle natural composition of gypsum and anhydrite.

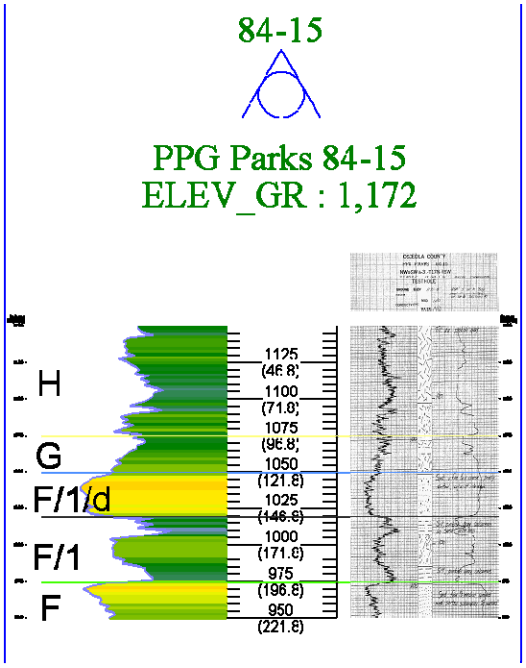


FIGURE D3.

- **Figure D3** (RIGHT) is a type curve of the natural gamma ray radioactivity of the hydrological unit in the AOR. This is from the PPG Parks 84-15, located in the NW/4SW/4 Section 31, Evart Township. This is in the immediate proximity to the proposed injection wells. The depth scale shows both measured depth and depth subsea.

The F/1 Unit which is described as a clay and silty clay, laminated to bedded, some interbeds of silt, massive silty sandy clay with pebbles common, serves as a hydrological barrier between confined and unconfined subsurface water systems.

The F/1 Unit confines the lower F Unit aquifer. It also serves as a vertical transmissibility barrier.

- **Figure D4** is a map showing the hydrological test wells drilled in the area for the sole purpose of mapping, understanding, and protecting the groundwater and any USDW within the AOR. These well locations have been used, in addition to water wells, to test and map the hydrological units and associated static ground water level.

- **Figure D5** is a cross section from the above referenced PPG Parks 84-15 hydrological well in NW/4 of the SW/4 of Section 31 to the PPG Babcock 85-13 hydrological well located in the NE/4NE/4 Section 36. The cross section moves from South to Northerly. There are control wells in this cross section that penetrate the entire quaternary aquifer system and encounter the Jurassic Bedrock. Also in the cross section is a proposed injection location to give point of reference to the quaternary hydrological units that will be intersected by the centrally located drilling pad.

- **Figure D6** is a cross section extending across the entire AOR, spanning an approximate 3.5 mile length from South to North, crossing the reference wells utilized in Figure D5.

- **Figure D7** is a cross section extending across the entire AOR, spanning an approximate 5.5 mile length from West to East, crossing the reference wells utilized in Figure D5. Also in the cross section is a proposed injection location to give point of reference to the quaternary hydrological units that will be intersected by the proposed injection well.

- **Figure D8** is a cross section generated by W.A. Menley, spanning and approximate 4.0 mile length from Northwest to Southeast across the AOR.

- **Figure D9** is a surfical geological soil map compiled from soil surveys from over 308 hydrological test holes and approximately 60 piezometers cataloging over 33,833 feet of groundwater and soil data compiled by W.A. Menley over the AOR. Contours showing the observed water table of the Upper Unit F are shown ontop of the soil catalogue (These same contours are highlighted and labeled for specific reference for Section D.6, Direction of Groundwater Flow and shown again in Figure D12).

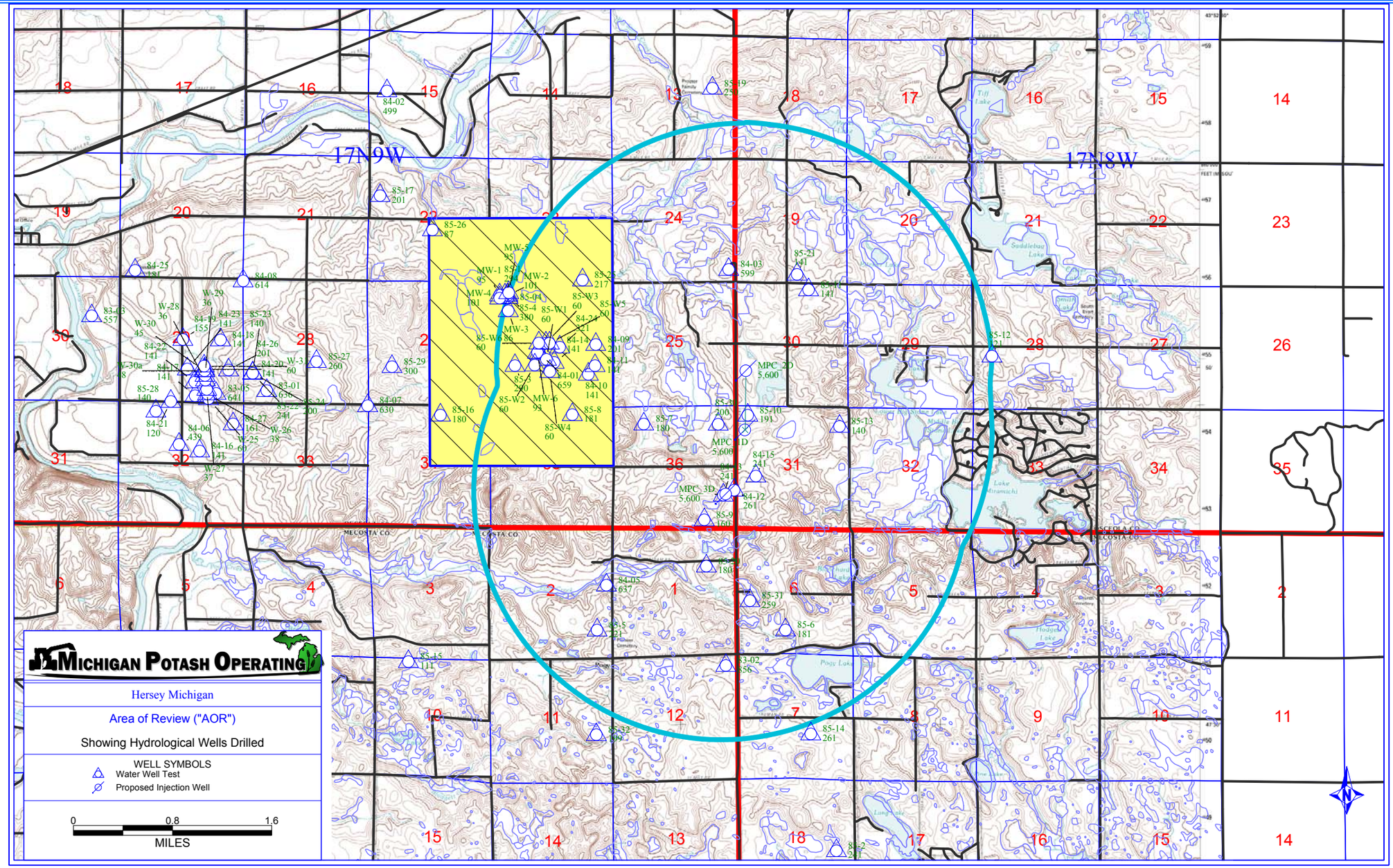
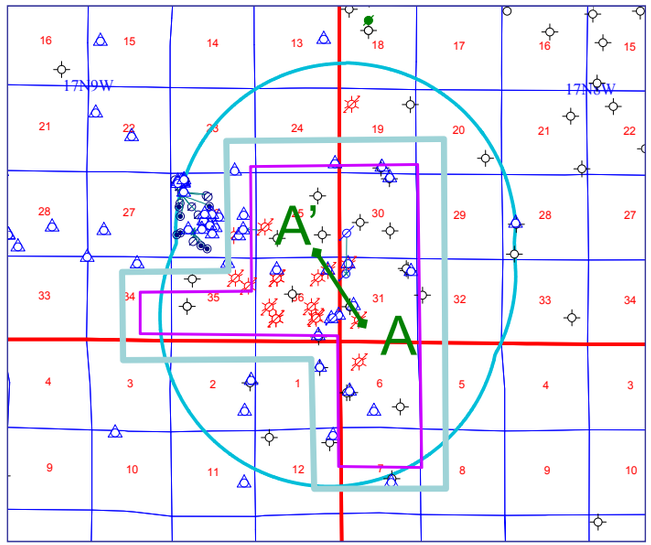


Figure D4. Map showing hydro-geological investigation wells (some, not all) drilled for the sole purpose of understanding, in order to protect, the groundwater and USDW within the AOR.



Proposed Injection Well Location

A

A'

PPG Parks 84-15
84-15

<0.05MI>

PARK
1-31

<0.17MI>

PPG Hodges 84-12
84-12

<0.18MI>

<0.36MI>

BABCOCK ET AL
1-36

<0.01MI>

PPG Babcock 85-30
85-30

ELEV_GR : 1,172

ELEV_KB : 1,185

ELEV_GR : 1,190

ELEV_KB : 1,125

ELEV_GR : 1,108

Regional Confining Layer

Primary USDW , Household

Secondary USDW , Industrial

Lowest USDW or potential USDW, < 10,000 TDS

Jurassic Age Red Beds, > 35,000 TDS

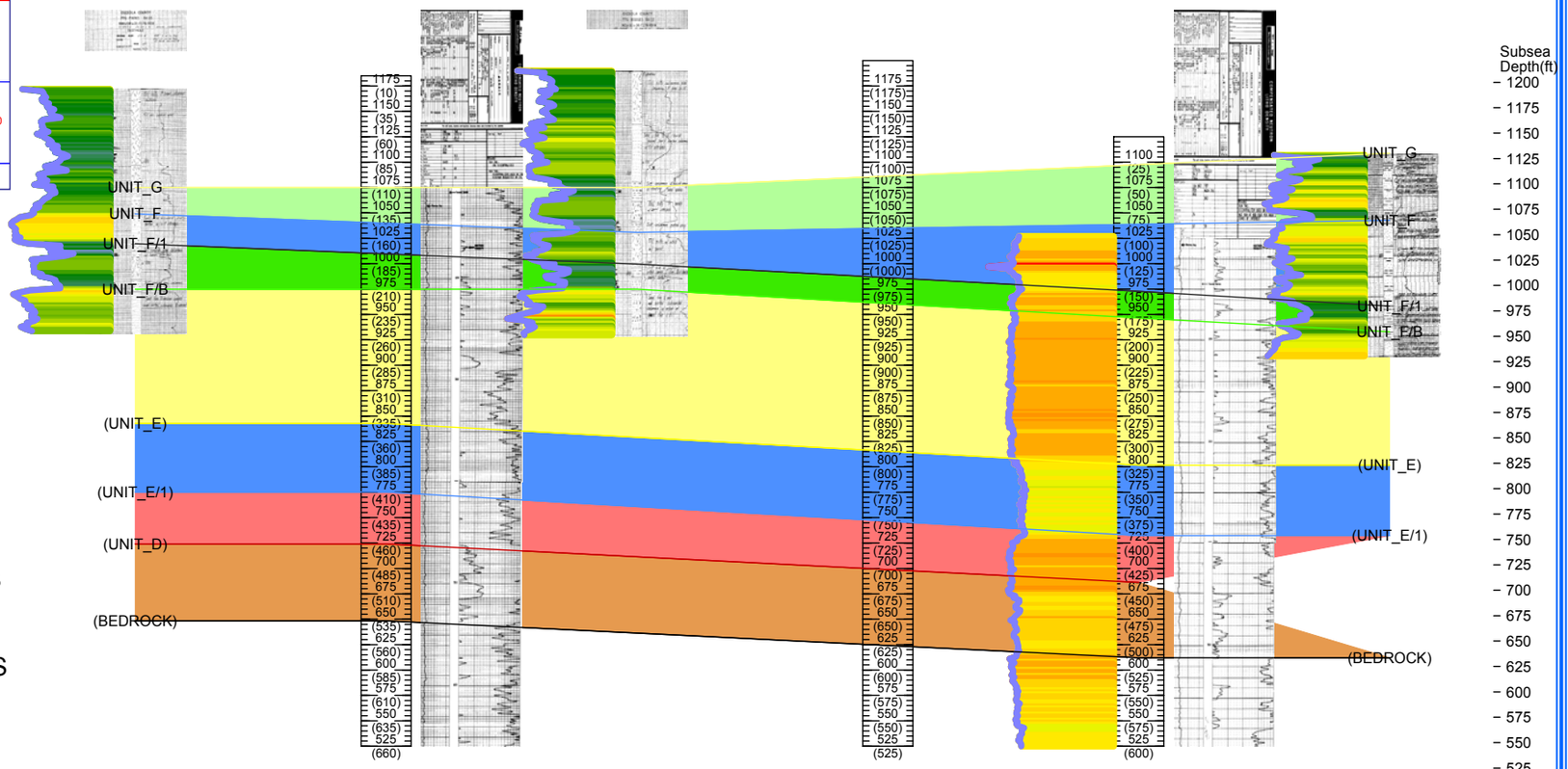


Figure D5. A cross section across in the immediate vicinity of the proposed injection wells. The cross Section A-A' and the path that it follows from South to Northerly, can be seen in the small reference map in the upper left corner. This cross section included hydro-geological wells, mineral wells and gas wells.

MICHIGAN POTASH OPERATING, LLC

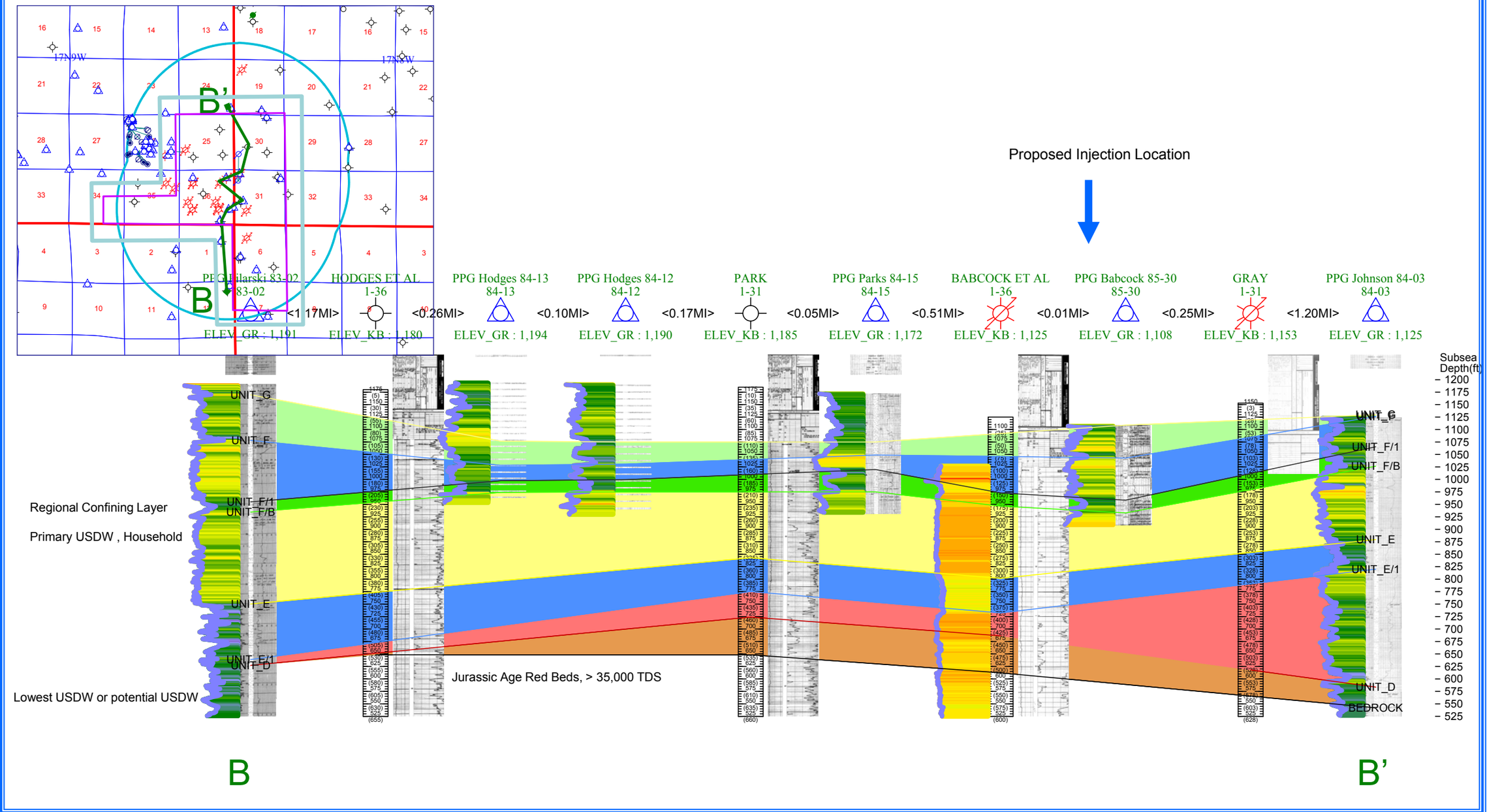


Figure D6. is a cross section extending across the entire AOR, spanning an approximate 3.5 mile length from South to North, crossing the reference wells utilized in Figure D5. The cross section path can be referenced by the small map in the upper left hand corner.

MICHIGAN POTASH OPERATING, LLC

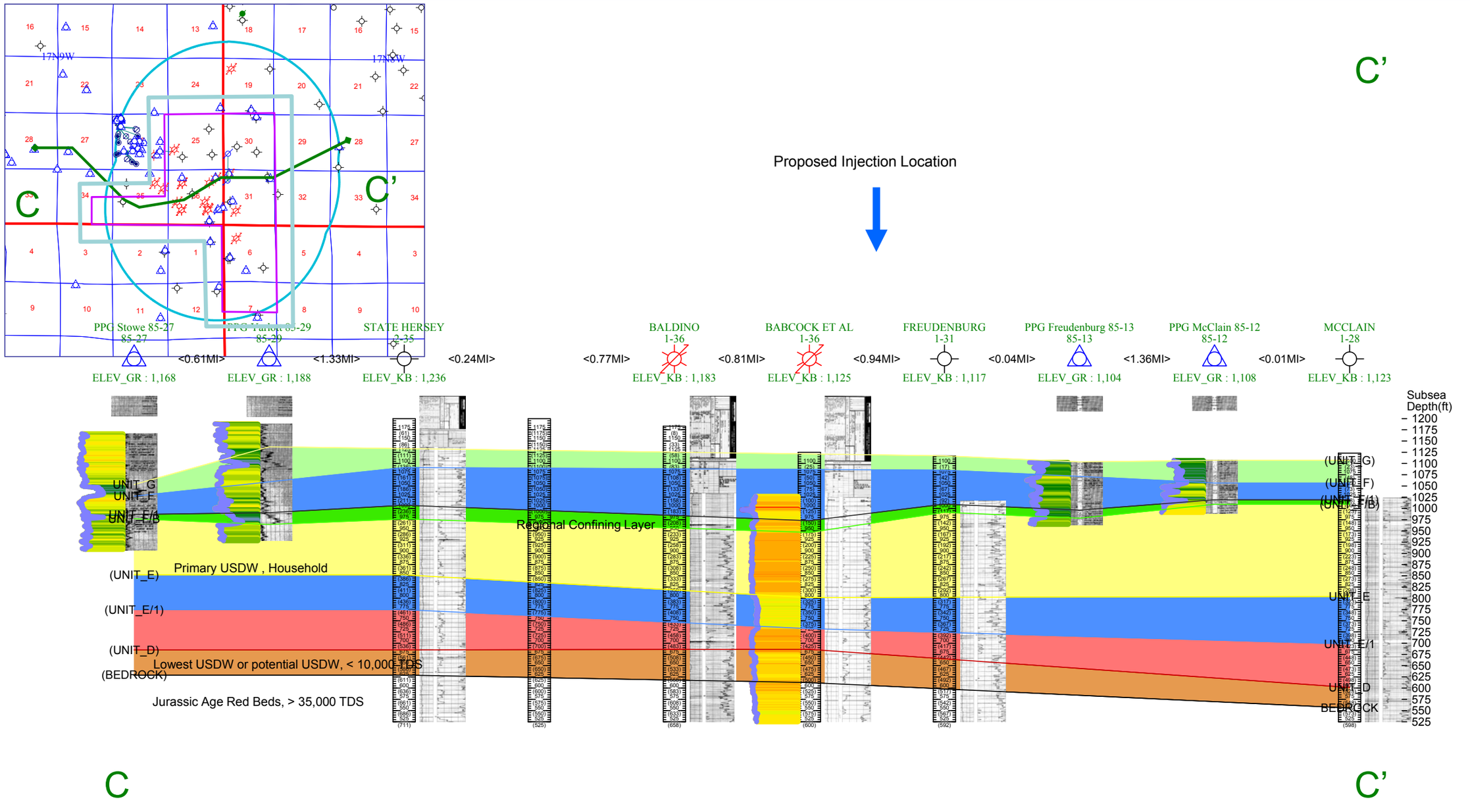
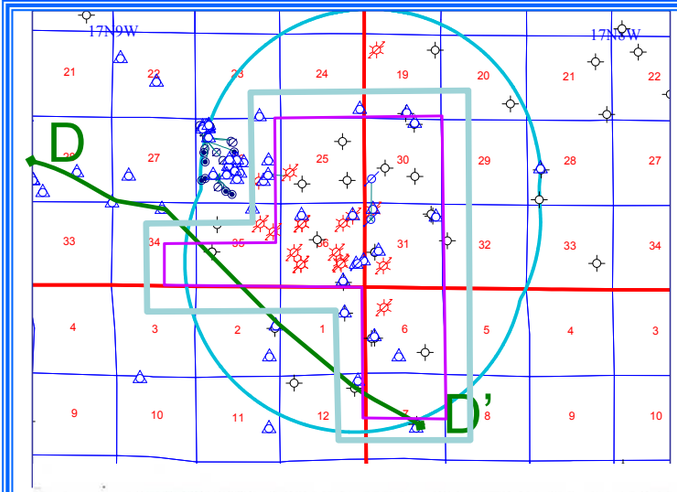


Figure D7. A cross section extending across the entire AOR, spanning an approximate 5.5 mile length from West to East, crossing the reference wells utilized in Figure D5. The cross section path can be referenced by the small map in the upper left hand corner.

MICHIGAN POTASH OPERATING, LLC



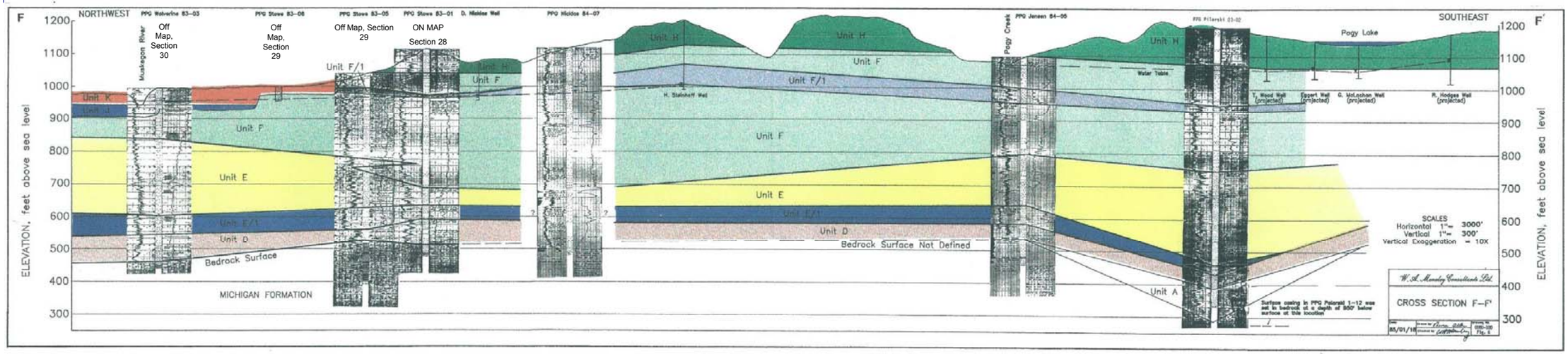
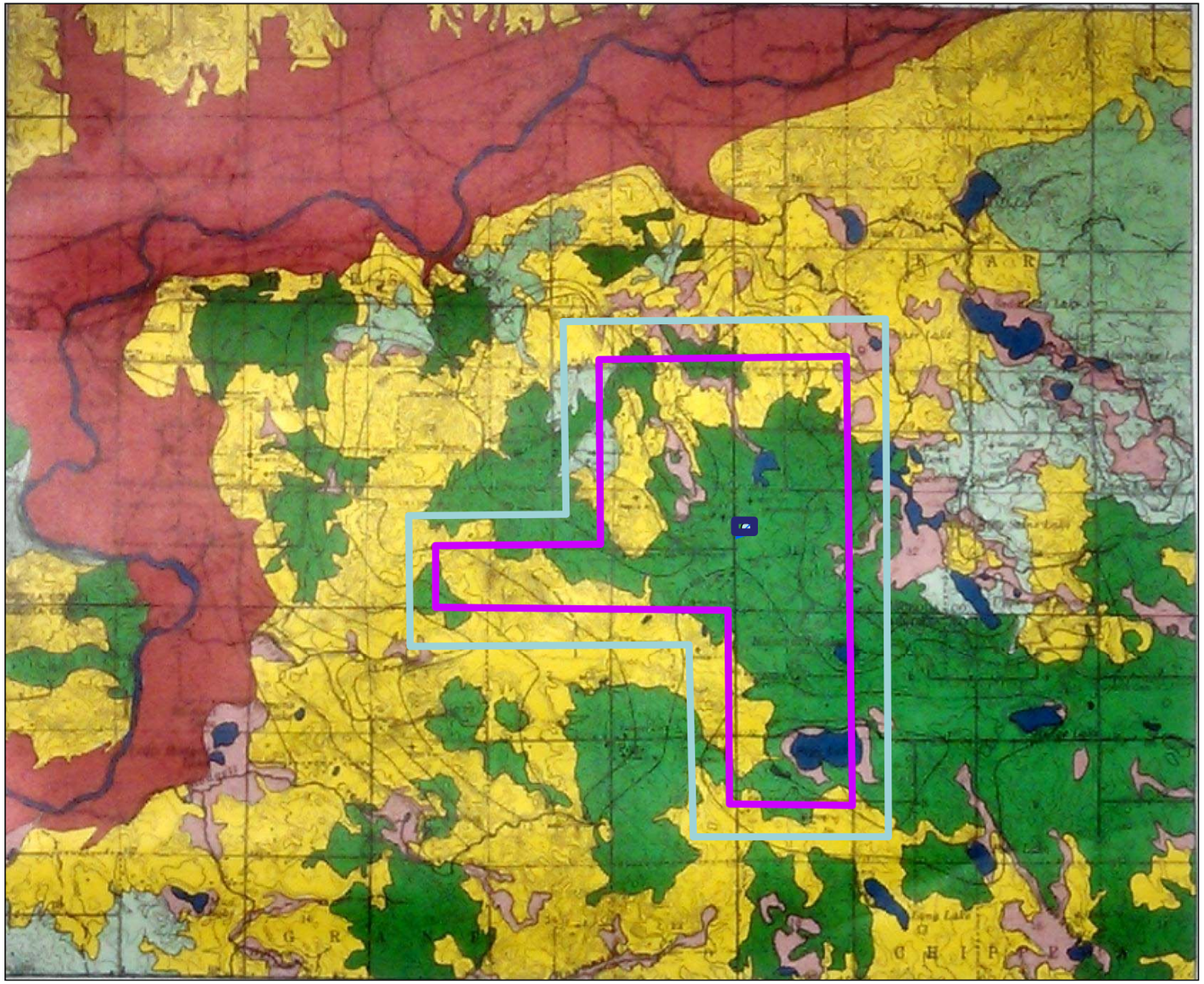


Figure D8. A cross section generated by W.A. Menley, spanning and approximate 4.0 mile length from Northwest to Southeast across the AOR.



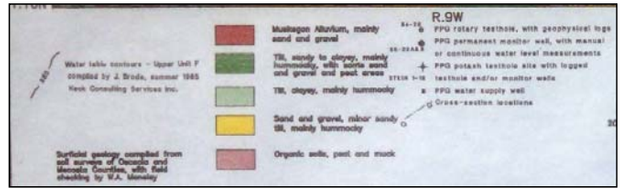


Figure D9. A surficial geological soil map compiled from soil surveys from over 308 hydrological test holes and approximately 60 piezometers cataloging over 33,833 feet of groundwater and soil data compiled by W.A. Menley over the AOR. Contours showing the observed water table of the Upper Unit F are shown on top of the soil catalogue. These lines are high-lighted for ease of review and re-referenced on Figure D12. The AOR radius is also shown. Also shown is the initial proposed distribution manifold location.

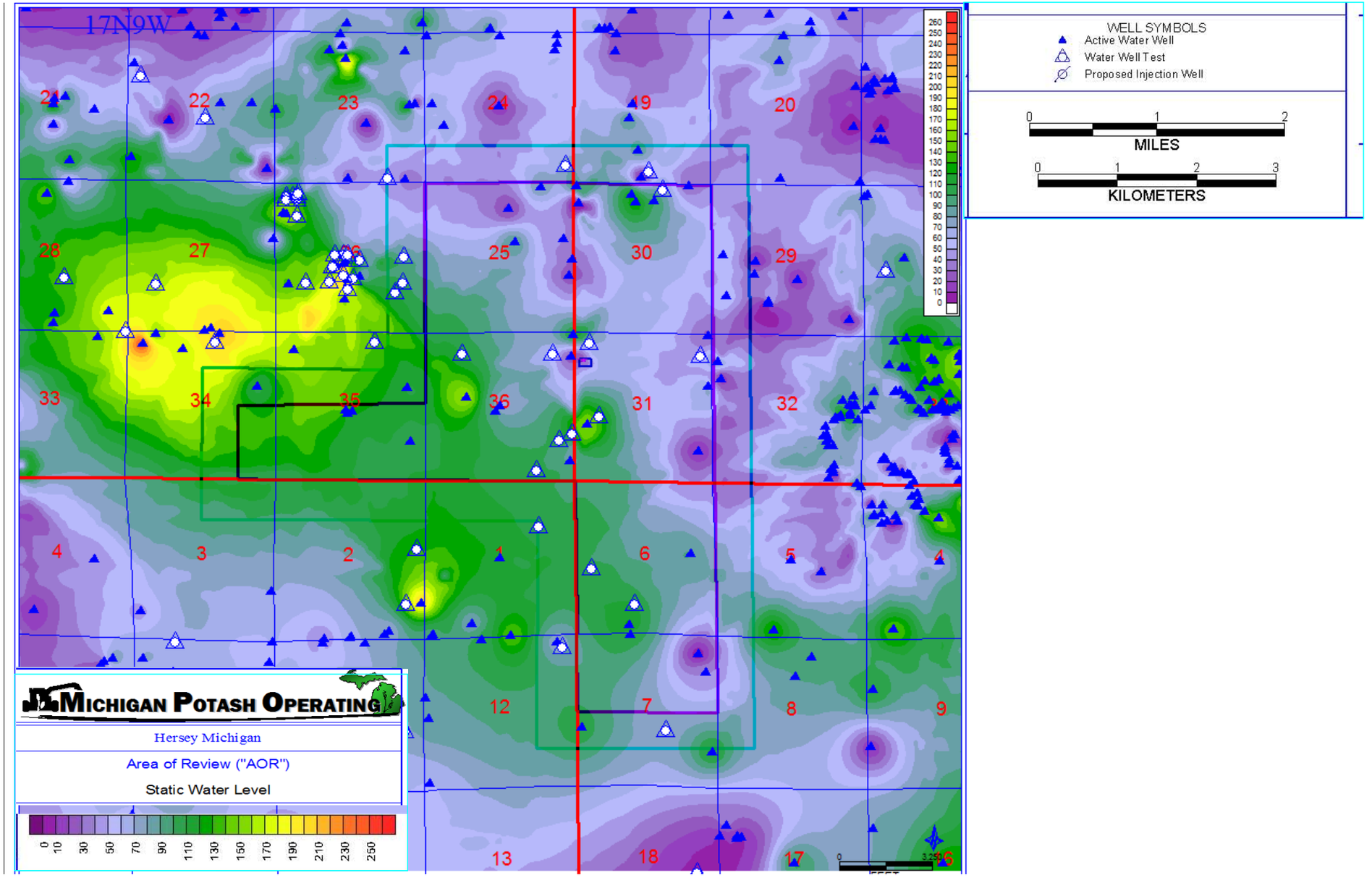


Figure D10. is a map showing the static water level as encountered in every water well within the AOR. The static water level is shown as feet below ground level. This map can be used, in collaboration with Figure D12, collaboratively to identify the principle direction of groundwater flow, which is toward the Muskegon River and its tributaries.

- **Figure D10** is a map showing the static water level as encountered in every water well within the AOR. The static water level is shown as feet below ground level. These contours are generated principally from reported and measured static water levels as extensively gathered and made available by the Michigan State ground water mapping project and Michigan Department of Environmental Quality, Water Division.

The extensive geological understanding and well control of the hydrological units within the area, give extra assurance that all USDW or potential USDW or any freshwater sources of water of any kind, whatsoever, are thoroughly and adequately protected and monitored.

D.3 Lowermost USDW

As described above, the lowest USDW is the Sub Unit E/1, or clay/till in unit D before saline Jurassic age red-beds are encountered.

Within the entire AOR, the lowest occurrence of the glacial drift occurs at approximately 614 feet. This is considered to be the base of the lowermost USDW - an area defined by the USEPA as an aquifer containing less than 10,000 parts per million of total dissolved solids (TDS). Below the glacial till and into the Jurassic redbeds, TDS is typically in excess of 35,000.

The lowest producing USDW in the AOR is at 340'; however, by federal US EPA standards, glacial till qualifies as the lowermost USDW and its deepest point in the AOR is at 614'. Based on hydrostatic analysis and direct drawdown tests associated with the E/1 unit at 340' and the observed static water level in the area (Figure D10), it is expected that the static water level at the lowest USDW, or 614' would approximate would approximate 130', which would be a hydrostatic head level of 209 psi.

D.4 Quaternary Aquifers

All USDWs described in Section D.2 are from Quaternary glacial deposits. Quaternary deposits come in direct contact with Jurassic age, bedrock in the AOR, as previously described.

The cross sections and the data compiled by PPG has been incorporated into all regional studies performed over the AOR.

Restated, three main quaternary aquifers exist in the AOR:

Along Muskegon River - shallow wells (<50 feet) completed in valley fill deposits within the river valley - not a really extensive but can sustain high pumping volumes.

Unit H - shallow wells (<100 feet) completed in moraine deposits - not a really extensive but adequate for most domestic and agricultural potable water sources.

Unit F - wells completed from 150 to 250 ft in a really extensive prolific producing outwash deposits

Unit E/1 – 250 to 614 ft water wells completed principally for industrial use.

D.5 Bedrock Aquifers

There are NO Bedrock aquifers in the AOR supplying any water, whether fresh or saline for any purpose.

Within the AOR, which deep and basin centered, none the bedrock aquifers contain any water with less than 35,000 mg/L concentration of water (Hydrogeology of Part of Osceola and Mecosta Counties, Michigan, W.A. Menley 3/1985).

For clarification purposes, an aquifer is defined as a system that has the ability to transmit water with porosity and potential permeability. All of the below listed zones may have that ability, but are deep, confined, and saturated with extremely highly TDS and chloride content, and/or oil and natural gas and are not suitable for any use, industrial or otherwise.

Restated, the below systems do not constitute any source of potable or usable source of water for industrial or any other purpose. They are deep, confined, and highly saline. In fact, most of the below mentioned zones are either Oil and Gas bearing reservoirs, or have been used as disposal horizons throughout Michigan and in Osceola or Mecosta County.

Pennsylvanian Aquifer System

Chemical analysis data indicate TDS and chloride content in Palma Sandstone and other Pennsylvanian age systems contain of 234,000 mg/1 and 141,000 mg/1, respectively in Mecosta County.

This system includes the sandstones of the Saginaw and Grand River Formations. It overlies the Mississippian sandstones of the Marshall and Michigan Formations and is overlain by the "red beds" of Jurassic time. At no place is the Pennsylvanian System 1,000 feet below sea level in Michigan. No areas of subsidence or catastrophic collapse due to solution mining are known to occur in Pennsylvanian rocks.

Mississippian Aquifer System

Chemical analysis data indicates an average IDS and chloride content in the Marshall Sandstone are 254,880 mg/1 and 150,136 mg/l, respectively in Mecosta County and 267,000 mg/1 and 142,000 mg/1 in Osceola County.

This system includes the sandstones of the Marshall Sandstone and the Michigan Formation which includes the Bayport Limestone. It overlies the Mississippian Coldwater Shales and is overlain by the Pennsylvanian sandstone and shales. The Mississippian Berea Sandstone is an aquifer in the area of subcrop beneath the glacial drift in southeast Michigan. No areas of subsidence or catastrophic collapse due to solution mining are known to occur in Mississippian rocks.

Devonian Aquifer System

Chemical analysis data indicates an average TDS and chloride content in the Dundee are 305,000 mg/1 and 162,000 mg/1, respectively in Mecosta County and 270,000 mg/1 and 147,000 mg/1 in Osceola County.

This system includes the sandstones of the Sylvania Sandstone and the carbonate rocks of the Detroit River, Dundee Limestone and Traverse Groups. It overlies evaporate and carbonate rocks of Silurian age and is overlain by shale of Mississippian or Devonian age. No areas of subsidence or catastrophic collapse due to solution mining are known to occur in Devonian rocks.

Silurian Aquifer System

This system includes the carbonate and evaporate rocks of the Niagara Series, the Burnt Bluff and Manistique Groups and the Engadine Dolomite, the Cayugan Series, Salina and Bass Island Groups. It overlies the Silurian shades and carbonates of the Cataract Group and is overlain by Devonian carbonate rocks of the Garden Island Formation and Detroit River Group. Silurian formations are important hydrocarbon producing formations in Michigan. No areas of subsidence or catastrophic collapse due to solution mining are documented for Silurian rocks, though the Salina Group evaporate are the most important source formations for artificial brine production in Michigan.

D.6 Direction of Groundwater Flow

Groundwater is the subsurface component of the hydrologic cycle. Some of the water that falls on the ground surface infiltrates into the ground and moves downward and laterally under the influence of gravity, emerging again at the ground surface at some lower elevation as groundwater discharge. In the AOR all water which infiltrates into the ground in the study area moves downward and laterally and eventually discharges to the Muskegon River. The winter flow of the Muskegon River and its major tributaries is made up almost entirely of groundwater discharge from aquifers within its drainage basin and a simple gravitational flow system is operative in this area. However, the details of the flow pattern have been modified by the stratigraphic sequence of the glacial.

Downward infiltration is impeded by the presence of relatively low permeability glaciolacustrine and till deposits, which is described in Section D.2 as the F/1 zone. This principle barrier (and to a lesser extent, other clay/silty variations in the irregular glacial till) layers or aquitards and they play a significant role in diverting and directing groundwater flow in the study area. The presence of these more or less continuous barrier layers tends to refract groundwater flow so that it moves laterally.

Figure D11 (Below) is a graphical illustration taken from Menely (1986) as it concerns direct reference to the AOR, in detail, showing the nature and direction of groundwater charge and lateral movement as dictated by glacio-lacustrine permeabilities. In the same figure, on the right, is a repeat of figure D3 that is the real well log associated with the initial proposed pad location. Together, this illustrates the direction and control on groundwater as it is observed throughout the AOR demonstrating the Menely's illustration with real geological data.

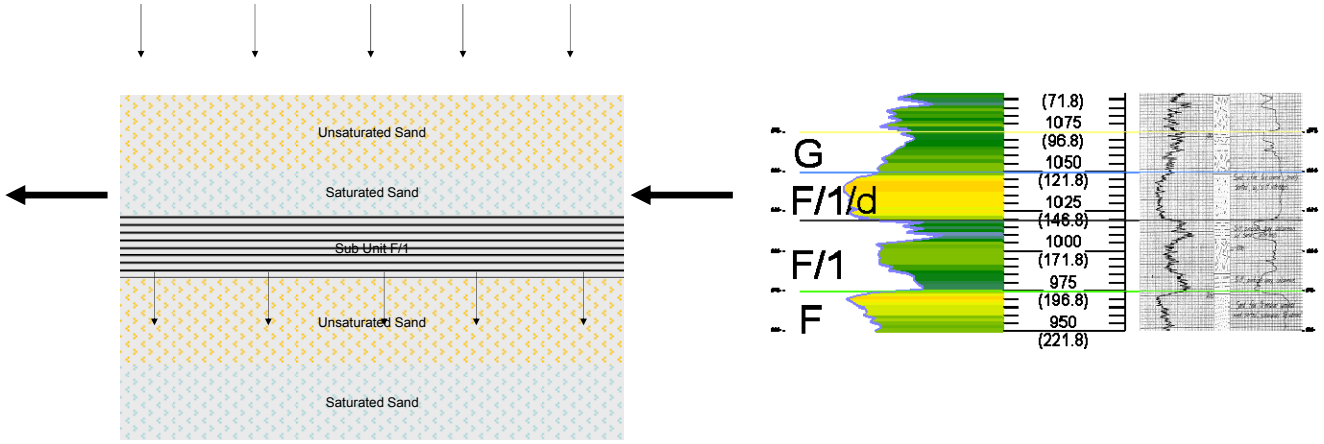


Figure D11.

Free downward percolation of groundwater is impeded by the presence of Unit G under some of the upland area and by the presence of low permeability barrier layers in Upper Unit F over most of the study area. Because Unit G is only discontinuously present in the study area it has little obvious effect on the regional groundwater flow pattern. The Upper Unit F barrier layers on the other hand are continuous except where they have been removed by later erosion, for example, along the course of the Muskegon Valley, and along some late glacial superglacial meltwater channel. Therefore, upper units F and F/1 have a significant effect on the subsurface flow patterns and on the distribution and flow of groundwater in the AOR.

Throughout the study area "perched water tables" are present above these barrier layers and unsaturated sand zones are present in the aquifers beneath barrier layers. This phenomena was recognized in the first testhole drilled near the Robert Stowe farm (PPG Stowe 83-01). There, a perched water table is present in the Sub-Unit F/1/d sand above the barrier layer Sub-Unit F/1/c. Perched water tables occur when the propensity for lateral flow in the aquifer underlying a barrier layer is greater than the vertical recharge downward through the barrier laver.

All the fresh water-bearing aquifers in the study area are part of a continuous,' dynamic system which is in equilibrium with the climate of the area. The barrier layers or aquitards are relatively impervious compared with the aquifers that are above and beneath them. All of them permit a finite amount of water to infiltrate through them to recharge the Lower Unit F aquifer below. For example, a typical barrier layer would permit vertical leakage of about one fluid ounce (30 mL) of water through each square foot per week under a unit hydraulic gradient.

The regional water level contour map (Figure D10) prepared by contouring the water level elevation in wells completed in all intervals, shows that the water table elevation in general conforms to the surface topography.

This is in corroboration with the original conclusion observed by W.A. Menley; but with updated water table data from additional real time data as provided by the State of Michigan for all catalogued water wells in the AOR and outside. This is used he direction of water flow is toward the Muskegon River and its tributaries in large part.

Figure D12 is a repeat of Figure D9, but for ease of review and comparison for the specific purpose of identifying the direction of ground flow in collaboration with Figure D10, has the observed hydrostatic head specific to the F1 USDW.

Figure 10 and Figure 12 can be used collaboratively to identify the direction of ground flow over the entire AOR; and the two corroborate.

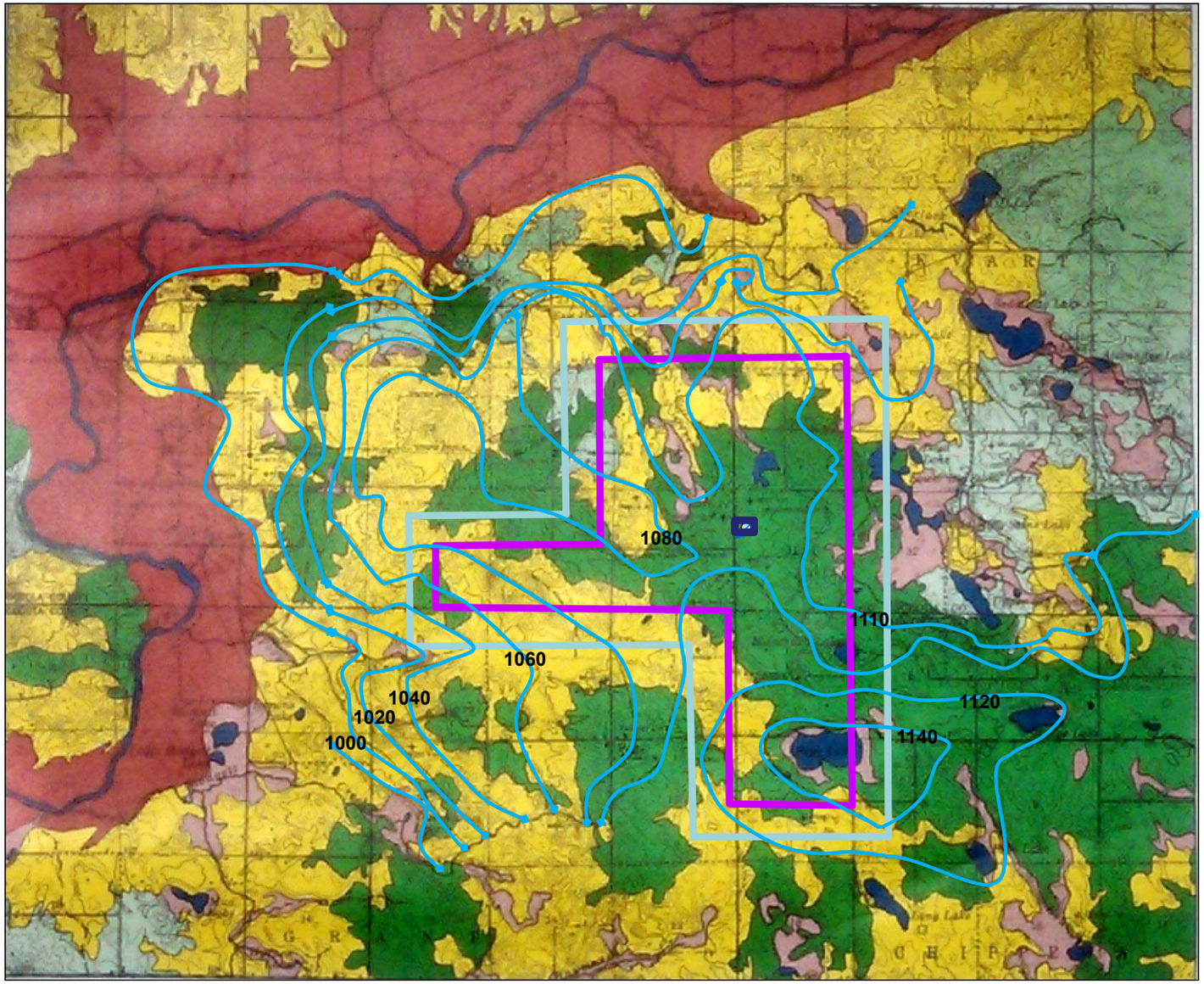
The observed water level elevations in the Lower Unit F aquifer are lower than observed in Upper Unit F but are always higher than the water level in the Muskegon River. Consequently, the observed hydraulic gradient in the Lower Unit F aquifer is also directed toward the Muskegon River. The hydraulic head information indicates that water which enters the Lower Unit F aquifer also discharges to the Muskegon River.

Because the amount of groundwater that infiltrates through Upper Unit F is small relative to the amount of groundwater that can be transmitted laterally through Lower Unit F the hydraulic head in Lower Unit F is low and is locally low enough that the sand immediately below Sub-Unit F/1/a is unsaturated. Similarly, beneath part of the area a finite fraction of the recharge to Lower Unit F moves downward through the Unit E barrier layer to recharge Sub-Unit E/1.

In a stratified flow system such as is present in the study area the recharge flux to each successively deeper aquifer is a small fraction of the recharge to the overlying aquifer. Most of the water that infiltrates into the ground will be discharged back to the ground surface through upland seeps and wetlands that form the tributaries to the Muskegon River or directly to the river itself.

The different water level elevations observed in wells of different depth, the observed gradient on the water table within mapable aquifer units, and the presence of unsaturated sand beds beneath low permeability barrier layers all confirm that the groundwater system is in dynamic equilibrium with the climate of this area.

The direction of groundwater flow over the AOR will not be impacted by any Class III activity. This has been demonstrated by 25 years of ongoing Class III operations immediately offset the AOR.



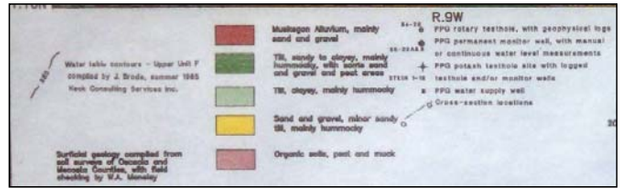


Figure D12. A surficial geological soil map compiled from soil surveys from over 308 hydrological test holes and approximately 60 piezometers cataloging over 33,833 feet of groundwater and soil data compiled by W.A. Menley over the AOR. Contours showing the observed water table of the Upper Unit F are shown on top of the soil catalogue. The AOR radius is also shown.

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US EPA UIC PERMIT APPLICATION FORM 7520-6

Sodium and Potassium

CLASS III

ATTACHMENT E: NAME AND DEPTH OF USDWs

DOES NOT APPLY TO CLASS III WELLS

THE UNITED STATES POTASH PROJECT
APRIL 2015

US EPA UIC PERMIT APPLICATION FORM 7520-6

Sodium and Potassium

CLASS III

ATTACHMENT F: MAPS AND CROSS SECTION OF GEOLOGIC STRUCTURE OF AREA

THE UNITED STATES POTASH PROJECT
APRIL 2015

ATTACHEMENT F
MAPS AND CROSS-SECTIONS OF GEOLOGIC STRUCTURE OF AREA

EPA instruction, form 7520-6 (2011):
Submit maps and cross sections detailing the geologic structure of the local area (including the lithology of injection and confining intervals) and generalized maps and cross sections illustrating the regional geologic setting. (Does not apply to Class II wells.)

F.1 Regional Geologic Setting

The Michigan Basin is a sedimentary basin centered in the Lower Peninsula of the US State of Michigan. The feature is represented by a circular pattern of geologic sedimentary strata with a nearly uniform structural dip toward the center of the peninsula (Figure 1). The extent of evaporative deposits and other shallow water deposits suggest concurrent subsidence during basin filling. High evaporation rates during the Silurian and Devonian geologic periods resulted in massive and pure bedded halite (NaCl), and the possibility of potassium chloride (KCl) in select locations due to mineral rich sea water.

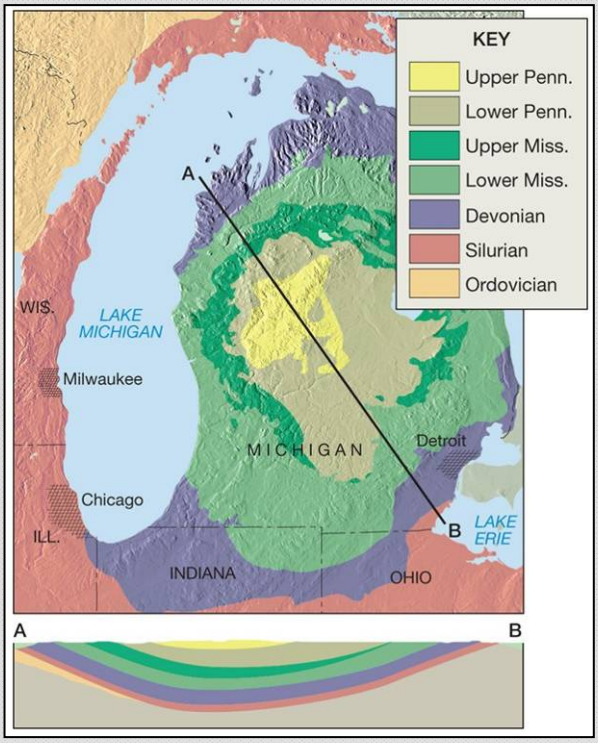


Figure F1. A geologic map of the sedimentary basin of Michigan, with a cross section shown from A to B. Salt occurs in Devonian Age (Blue). Salt and Potash occur in the Silurian Age (Red).

Massive bedded halite occurs in beds of the Silurian Salina Formation, and the Devonian Detroit River Group. Dow Chemical began mining Michigan's salt rich brines in 1897, creating a commercial source of potassium, calcium, and magnesium salts, bromine, and iodine. Dow Chemical remains headquartered in Midland, Michigan. Morton International, Martian Marietta Materials, and The Detroit Salt Company are other salt and mineral producers with an economic interest in salt and salt related deposits in Michigan.

The Michigan Basin is the dominant structural feature of the Michigan southern peninsula. It is a nearly circular and symmetrical structural and sedimentary basin. A maximum aggregate thickness of about 14,000 feet of Cambrian through Jurassic sedimentary strata was deposited in the basin. The basin first developed as a structural feature in late Silurian time during which approximately the middle one-third of the total sedimentary rock formation was deposited.

- **Figure F1** (Above and Right) is a generalized map of the sedimentary basin sedimentary basin of Michigan.
- **Figure F2** is the Michigan stratigraphic column illustrating the lithology of the sediments which fill the Michigan Basin and occur in the AOR.

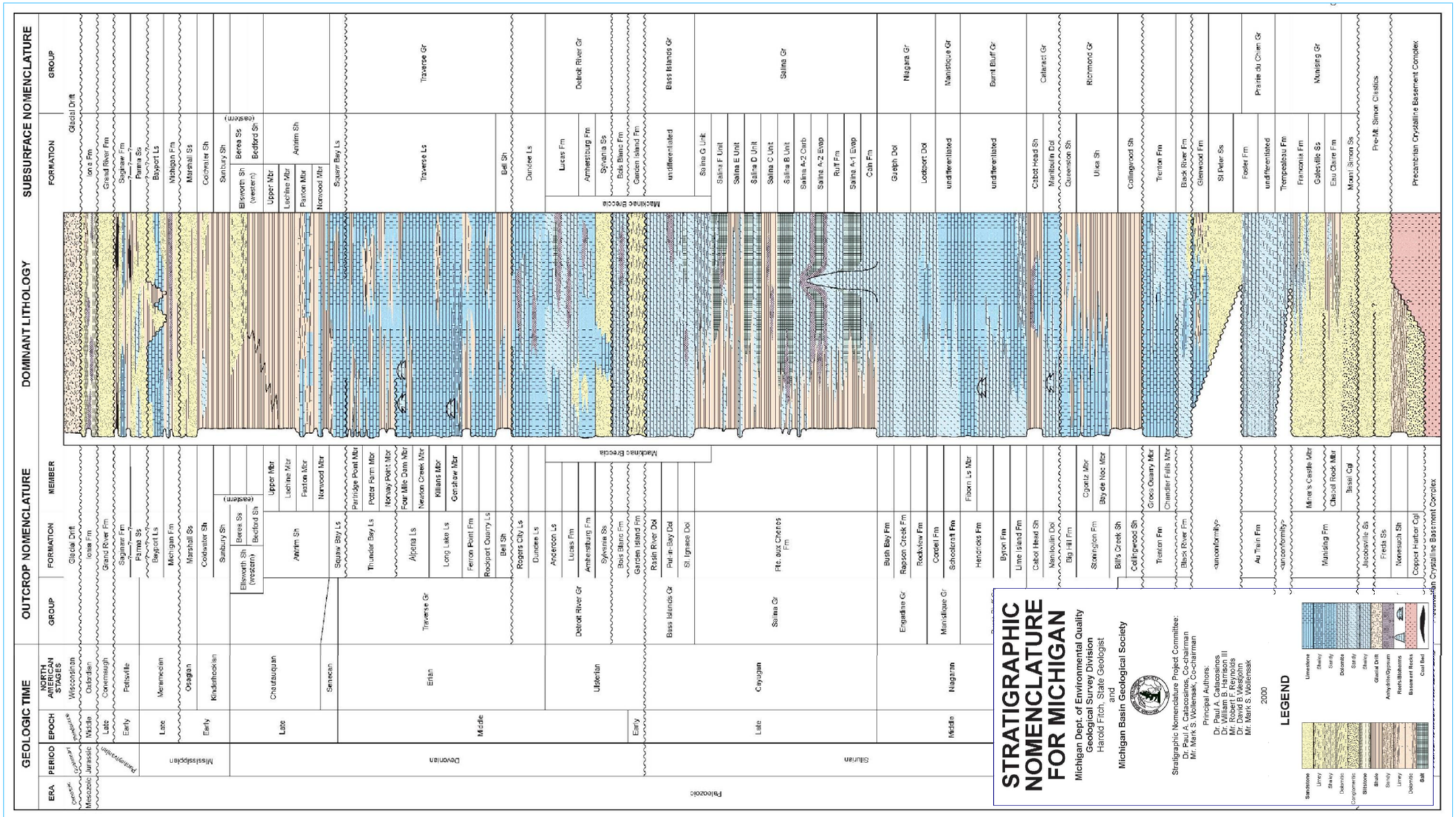


Figure F2. Figure F2 is the Michigan stratigraphic column illustrating the lithology of the sediments which fill the Michigan Basin and occur in the AOR.

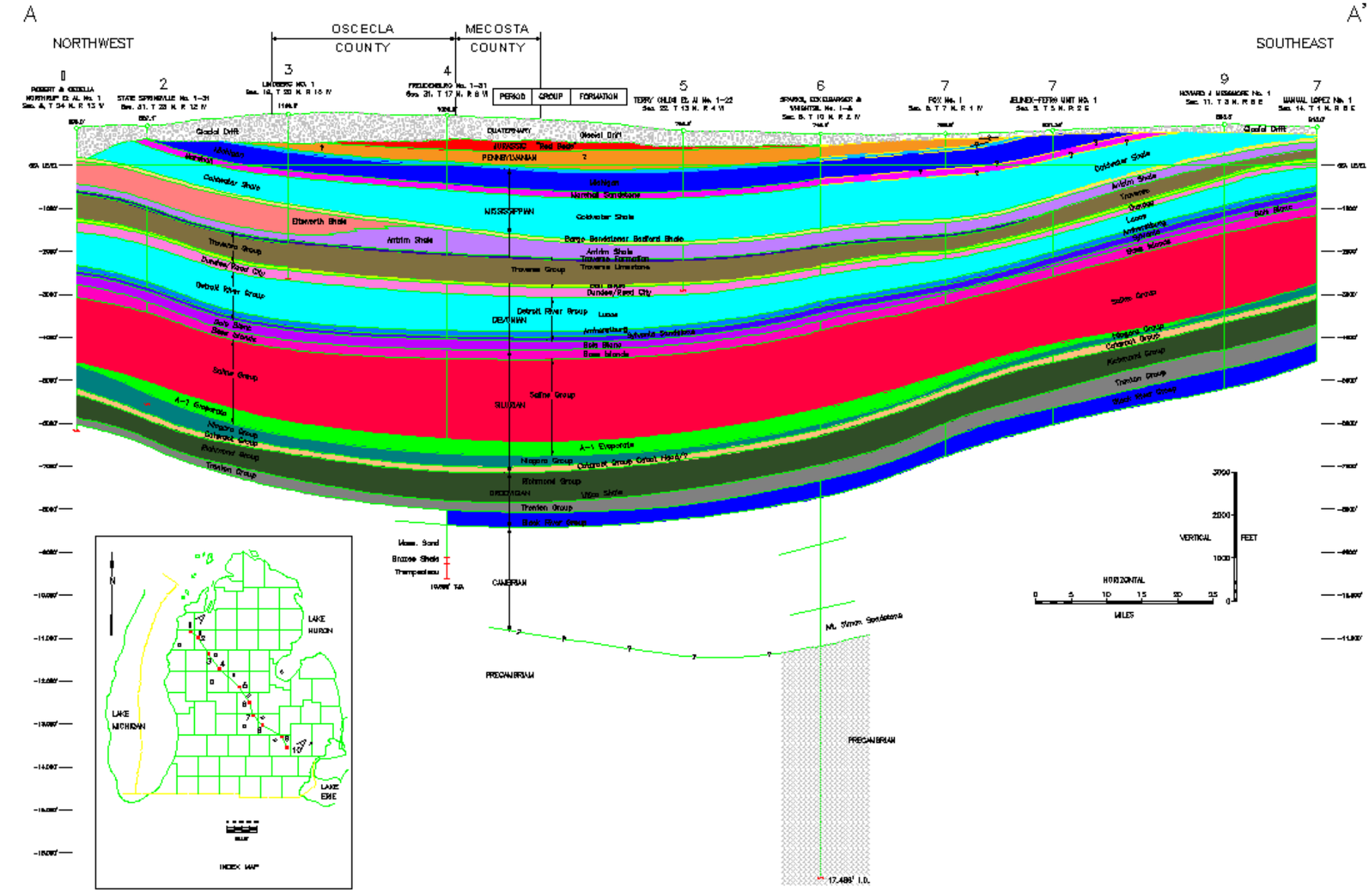


Figure F3. A detailed northwest-southeast regional cross-section through the estate of Michigan, drawn through the AOR, utilizing the deepest well in the AOR (Fruedenburg 1-31 - 10,858 feet), which is included in the AOR. The A-1 Evaporate is lime green and consists of sodium and potassium elements and is the Class III horizon (Section 31, Evart Township, Osceola County, Michigan).

The southern Osceola/northern Mecosta County area is covered by several hundred feet of Pleistocene glacial drift. The glacial deposits rests on Jurassic "red bed" sediments of Pennsylvanian shale and sandstone. The Paleozoic rock section, from Pennsylvanian downward, likely exceeds 10,000 feet in the area, and includes shale, limestone, dolomite, sandstone, anhydrite, and salt. The Precambrian basement beneath the Paleozoic deposits is not known to have been penetrated in the area but is thought to lie over 11,000 feet below the surface.

- **Figure F3** is a detailed reproduction of the northwest-southeast regional cross-section shown in Figure F1, drawn immediately through the AOR. The section utilizes the deepest well in the area (Freudenberg 1-31 - 10,858 feet), which is in the same section as the proposed initial directional drilling location (Section 31, Evart Township, Osceola County, Michigan). This cross section also utilizes the deepest reported well in the Michigan Basin (Sparks, Eckelberger, and Wrightsil 1-8 - 17,466 feet). Figure F3 shows the structural configuration of the Class III salt/injection interval, which is virtually flat in the AOR, expressing less than a 1% Dip (50' every 1 mile) in North-Northeasterly fashion. Figure F3 has a vertical exaggeration approximating 50 to 1.

F.2 Proposed Class III Injection Horizon

Michigan Potash Operating proposes the following Class III Permit Horizon:

Salina A-1 Group, an interbedded carbonate and salt interval with an approximate top of 7,500' and a bottom of 7,950' TVD. The top of the Salina A-1 Group is marked by the Salina A-1 Carbonate (+/- 7,500' TVD) and the bottom of which is marked by the Niagran (+/- 7,950' TVD).

Injection is controlled and contained within the impermeable salt horizons containing thin bedded potash deposits below the Salina A-1 Carbonate, but above the Niagran.

- **Figure F4 (next page)** is an excerpt from Figure F2 with particular focus on the proposed Class III injection horizon. The targeted sodium and potassium chloride salts occur in the Salina A-1 Group, below the A-1 Carbonate.

Salt A is the oldest unit and it rests unconformably over the Niagran carbonates. The unit can be subdivided into A-1 and A-2 separated by a carbonate section. Over 60-150 m (180-500 ft) of clean A-1 salt can be found in the Basin interior. The A-2 salt is the thickest massive salt unit found in most parts of the Michigan Basin (Johnson and Gonzales, 1978). Approximately 100-150 m (300-500 ft) of salt has been measured. Generally A1 salt is over 50 m (150 ft) thick and is at least 75% pure (Terralog, Dec. 30, 2001). Salt B is thick and clean in the lower part, but has interbedded shales and dolomites in the upper part. Over 100-150 m (300-500 ft) of salt can be found (Johnson and Gonzales, 1978). Salts C, D and E salt units are dirty salt, mainly shales with 20-25% dolomites. Individual salt beds ranges from 2-30 m (5-60 ft) thick. Salt F is the youngest salt unit within the Salina Group. It consists of alternating clean and impure salt beds interbedded with shale, dolomite and anhydrite. The F salt is thickest at the Basin center where 300 m (1,000 ft) have been measured. Most salt beds are 2-6 m (5-20 ft) thick, but can reach 30 m (100 ft) thick (Johnson and Gonzales, 1978). Salt G is predominately a shale unit.

Michigan Potash Operating proposes to drill to 7,800' True Vertical Depth, directionally, initially from 8 wells, targeting the Salina A-1 Salt; via an operational method similar to that utilized by Mosaic Potash Hersey and its predecessor companies over the MI-133-3G-A0002 Area permit, immediately offset and for Sodium and Potassium salts in the Salina A-1 Group.

The Michigan Basin evaporates, particular in the basin center, where the proposed Class III area occurs, are massive, measuring over 1,750' of thick clean salts, interlayered with an occasional, very, tight carbonate or organic silt. There is 1,200' between the top of the Salina G Evaporate and the Salina A-2 Carbonate in the Grey 1-31, and an additional 550' between the top of the Salina A-2 Carbonate and the top of the Salina A-1 Carbonate. The Grey 1-31 is a representative type curve immediately underlying the proposed central drilling location and is respective of the entire AOR.

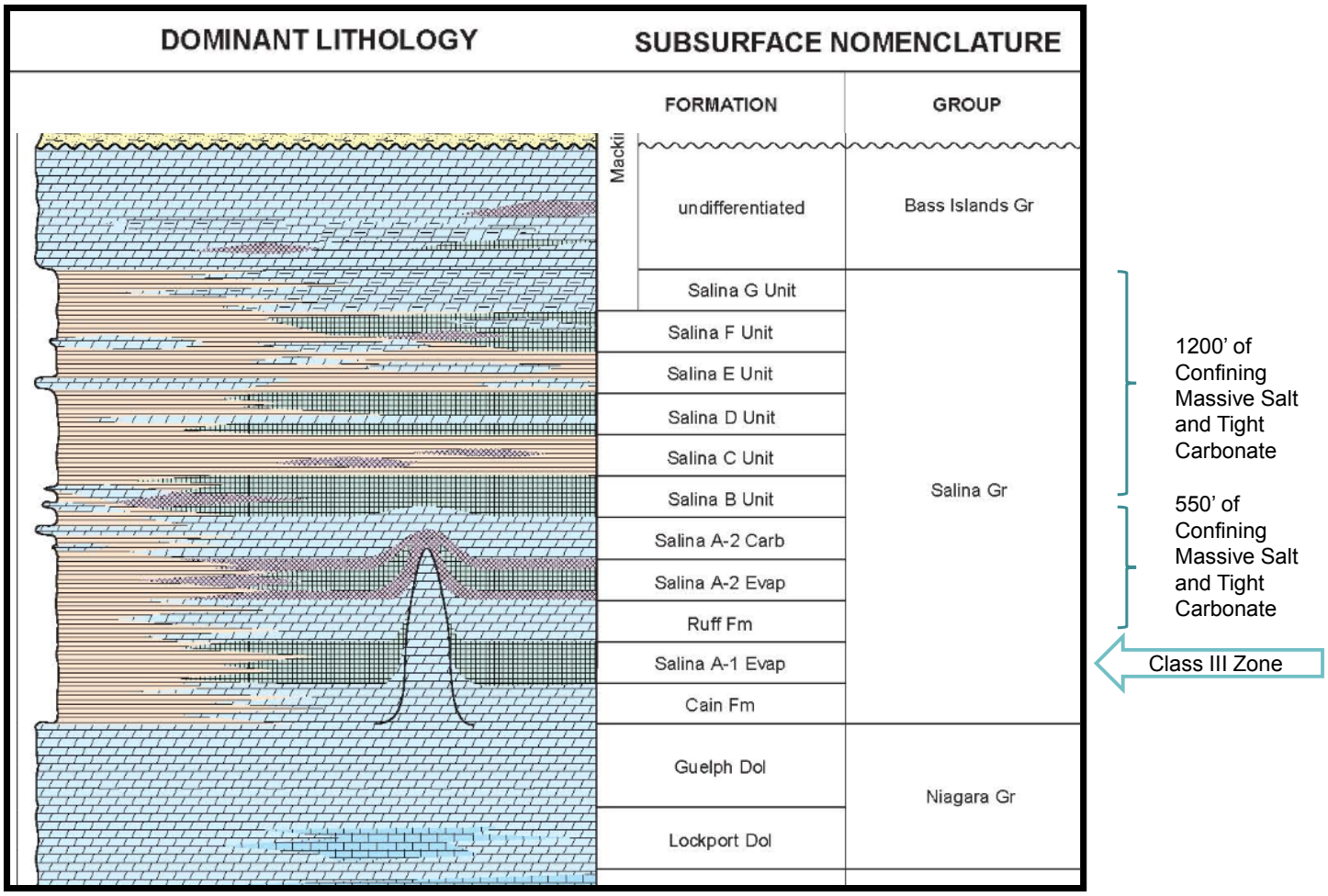


FIGURE F4. A excerpt from the Michigan Stratigraphic Column (Figure 2), with a particular emphasis on the proposed Class III interval and the overlying salts and confining intervals, measuring of 1,750'.

The Class III interval is massive bedded sodium chloride salt with thing bedded potassium chloride which is the target injection intervals.

This will leave a between 50' to 100' of impermeable bedded salt above the proposed injection horizon.

Above the salt roof is the Salina A-1 Carbonate, which is a 50', tight carbonate with less than 2-4% porosity and bears hydrocarbon natural gas.

Above the Salina A-1 Carbonate, lies the Salina A-2 salt, or another 400' of massive impermeable salt.

Salt is arguably nature's most reliable sealing mechanism to prevent the migration of fluids; demonstrating zero porosity and zero permeability, with the ability to heal and flex in the event of stress; hence its utilization for the U.S. National petroleum reserve and the waste isolation pilot plant, to name a few.

Below the injection horizon is 150' foot of massive bedded salt, isolating downward movement of fluids. Below this salt horizon is the Niagran carbonate; which in this basin centered location does not display any porosity, on average over the AOR showing 1%.

Figure F5 shows

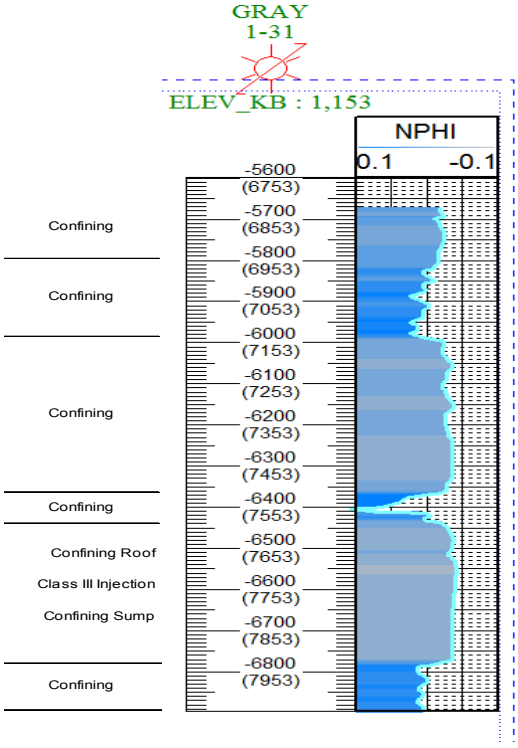
(1) A regional map of Michigan, showing the structure of the Salina A-1 Group across the entire state, with a reference to the AOR; and

(2) A geophysical type curve of the Class III injection horizon in the Salina A-1 Group and from the Grey 1-31, located in the NW/4NW/4 Section 31, which is in the immediate vicinity of the proposed initial injection location; as well as showing it relation to the 1,750' of confining massive bedded salt and tight carbonates (the majority of which is massive bedded salt) and;

(3) A pictographic and summary description of the core analysis and methods of salt and potash inspection, in the proposed injection interval in the Grey 1-31, located in the NW/4NW/4 Section 31. This method served as the basis for comprehensive elemental analysis showing food grade salt and food grade potash with no harmful constituents of any kind whatsoever (See Figure F6); this also shows a historical test as performed by PP&G in 1984 in the subject well; and

(4) Lithologic descriptions and associated porosity-permeability observations provided the interval is non-porous salt; as observed by real core inspection, or over real well log in the case of tight carbonates, of over 50 wells in the AOR or immediate vicinity of the AOR.

The Salina group showing the target injection and confining intervals as determined from well log analysis and core observations is also shown below for ease of reference:



Zone	Footage	Porosity	Permeability	Description
Salina B Salt	380'	0	0	Massive Bedded NaCl (Salt)
Salina A-2 Carbonate	100'	1.5-2.0%	.001-.01 md	Carbonate
Salina A-2 Salt	400'	0	0	Massive Bedded NaCl (Salt) with interbedded KCl (Potash)
Salina A-1 Carbonate	50'	2-4.0%	.001-.01 md	Carbonate
Salina A-1 Salt	300'	0	0	Massive Bedded NaCl (Salt) with interbedded KCl (Potash)
Niagran	250'	1.0%		

Figure F6 is a cross section through the AOR, showing the geological units of from the Salina A2 Carbonate to the base of the Niagran Carbonate. The centerpoint of the proposed injection interval has been marked with a blue line. By utilizing this line as a point of reference, the confining salt thickness above and below fluid introduction can be inferred. The AOR is in a structurally undisturbed area, with regional dip less than 1 degree in a West to Easterly direction. There are no observable faults in the AOR. This figure shows the Salina Salts and the proposed injection interval between the A1 Carbonate and the Niagran formation. The gradual basin dip, approximating 1.0 degree or 50' for every 1 mile can be observed from West to East. This cross section covers 3 miles from West to East, and 150' of vertical depth is obtained. There are no observable faults in the AOR.

Figure F7 is a cross section through the AOR similar to Figure F6, from the Salina A2 Carbonate to the base of the Niagran Carbonate. This cross section has been drawn from North to South. This figure shows the Salina Salts and the proposed injection interval between the A1 Carbonate and the Niagran formation. From North to South, 50' of depth is lost, over 4 miles of cross sectional coverage.

Figure F8 is a cross section across the immediately proposed pad and distribution manifold location. This cross section shows the USDWs in relation to the proposed injection zones in the immediate proximity of the AOR. The larger cross section is intentionally shown on a 1:1 ratio, with no vertical exaggeration to illustrate the amount of interlayered and non-permeable intervals between any potential injection zone and any potential USDW.

- **Figure F9** is a cross section across the entire AOR, with the same well selection as that shown in Figure F6 from West to East. This cross section shows the USDWs in relation to the proposed injection zones in the immediate proximity of the AOR. The larger cross section is intentionally shown on a 1:1 ratio, with no vertical exaggeration to illustrate the amount of interlayered and non-permeable intervals between any potential injection zone and any potential USDW.

- **Figure F10** is a cross section across the entire AOR, with the same well selection as that shown in Figure F7 from North to South. This cross section shows the USDWs in relation to the proposed injection zones in the immediate proximity of the AOR. The larger cross section is intentionally shown on a 1:1 ratio, with no vertical exaggeration to illustrate the amount of interlayered and non-permeable intervals between any potential injection zone and any potential USDW.

The flat, undisturbed, structurally quiet, geological character of the AOR can be observed in Figure F6 through Figure F13. There is little to no structure; no tectonics and no known faults in the AOR.

No evidence of faulting or other structural disturbance has been detected in this area and there are no references to faulting in any of the geologic literature pertaining to this area.

The salts of the A-1 evaporate were deposited in a marine basin whose circulation was restricted from the open sea. As evaporation proceeded, thick sequences of bedded salt accumulated.

Climatic conditions during A-1 Evaporite deposition were arid, and evaporation far exceeded the influx of fresh water into this restricted marine environment. The accumulation of thin parallel layers of halite over wide distances indicates that deposition occurred in a relatively undisturbed environment. The thin anhydritic varves probably represent a cyclical form of deposition related to slight changes in temperatures or concentration of the brine.

At the end of A-1 Evaporite deposition, a marine transgression resulted in deposition of the limestones and dolomites of the A-1 Carbonate.

Subsequent marine transgressions and regressions resulted in deposition of the entire Salina Group of sediments according to a similar pattern.

No major structural or tectonic episodes caused subsequent disturbance of the bedded halite in the study area. As the basin continued to fill with sediments.

In general, the history of the Michigan Basin is one of tectonic stability since the beginning of the Paleozoic era. In the study area investigated, the Salina salts, and in particular the A-1 Evaporite, are virtually free of significant deformation.

- **Figure F11** is a structure map of the A-1 Carbonate, which lies above the A-1 Evaporate.

- **Figure F12** is a structure map of the of the A-1 Evaporate, and the proposed injection interval. This is a 300’ thick (See Figure F15) massive bedded salt.

- **Figure F13** is a structure map of the A-2 Carbonate. This zone lies 640’ above the proposed Class III Injection horizon.

- **Figure F14** is a structure map of the A-2 Evaporate. This zone is a 500' thick massive bedded salt above the Salina A-1 Carbonate.

- **Figure F15** is an isopach (thickness map) of the Salina A-1 Evaporate across the AOR, which averages 330' of thickness in the AOR.

- **Figure F16** is a 8 ½ x 11" diagram showing well construction and corresponding site stratigraphy for a Typical Vertical Class III Injection well.

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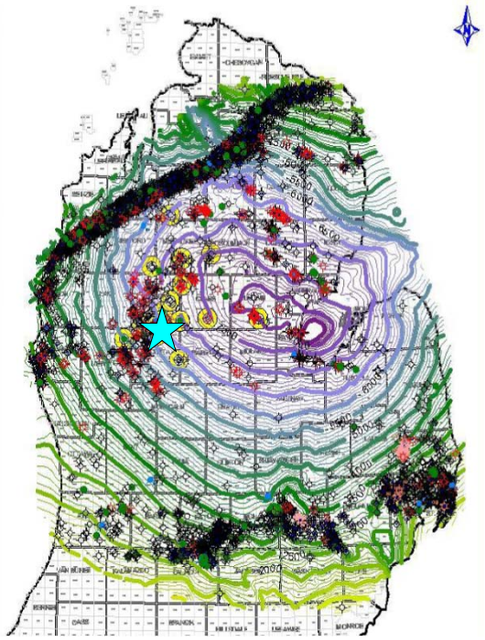
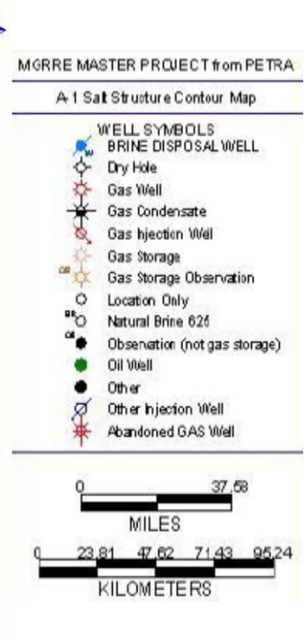
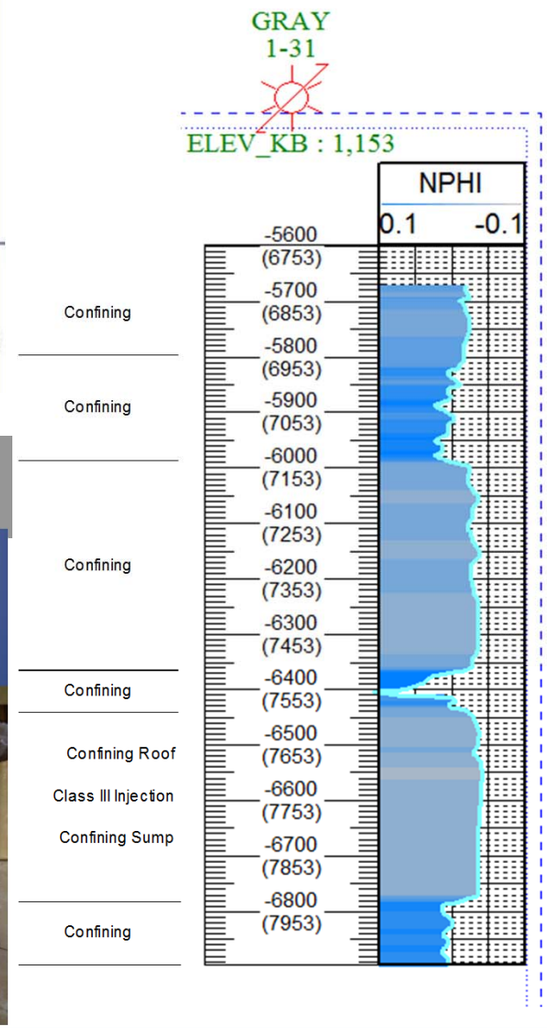
Salina A-1 Salt, Detail and Confining Interval Detail





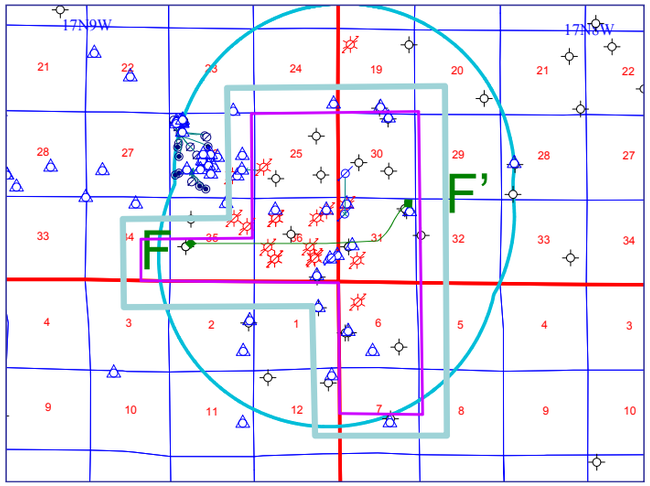
Core Photographs And Analysis

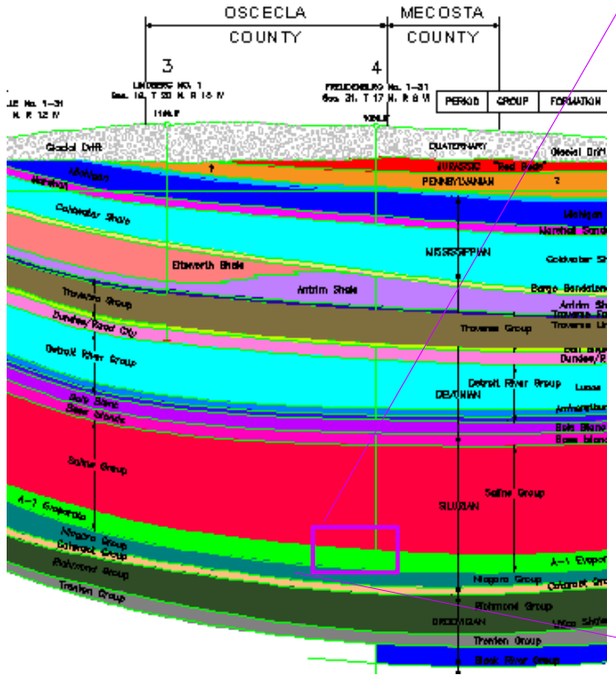
- Some samples of split core portion (1/4 or 1/8) of whole core
- Most samples were from powder drilled from fresh core surface in the interior of a split core
- Half meter to one meter sampled continuously



Zone	Footage	Porosity	Permeability	Description
Salina B Salt	380'	0	0	Massive Bedded NaCl (Salt)
Salina A-2 Carbonate	100'	1.5-2.0%	.001-.01 md	Carbonate
Salina A-2 Salt	400'	0	0	Massive Bedded NaCl (Salt) with interbedded KCl (Potash)
Salina A-1 Carbonate	50'	2-4.0%	.001-.01 md	Carbonate
Salina A-1 Salt	300'	0	0	Massive Bedded NaCl (Salt) with interbedded KCl (Potash)
Niagran	250'	1.0%		

Figure F5. shows (1) a geophysical type curve of the injection and confining horizons in the Salina A-1 salt from the Grey 1-31, located in the NW/4NW/4 Section 31 (2) photographs and summary of the sampling methodology of extensive core analysis over the entire AOR by Michigan Potash Operating in conjunction with Western Michigan University and the Michigan Geological Survey and (3) thickness, and permeability and porosity summaries determined from extensive core and well log review performed by Michigan Potash Operating, Western Michigan University, and the Michigan Geological Survey (4) a structure map of the Salina A-1 Group over the entire state, as it relates to the AOR (5) lithologic descriptions as observed by core analysis.





MICHIGAN POTASH OPERATING, LLC

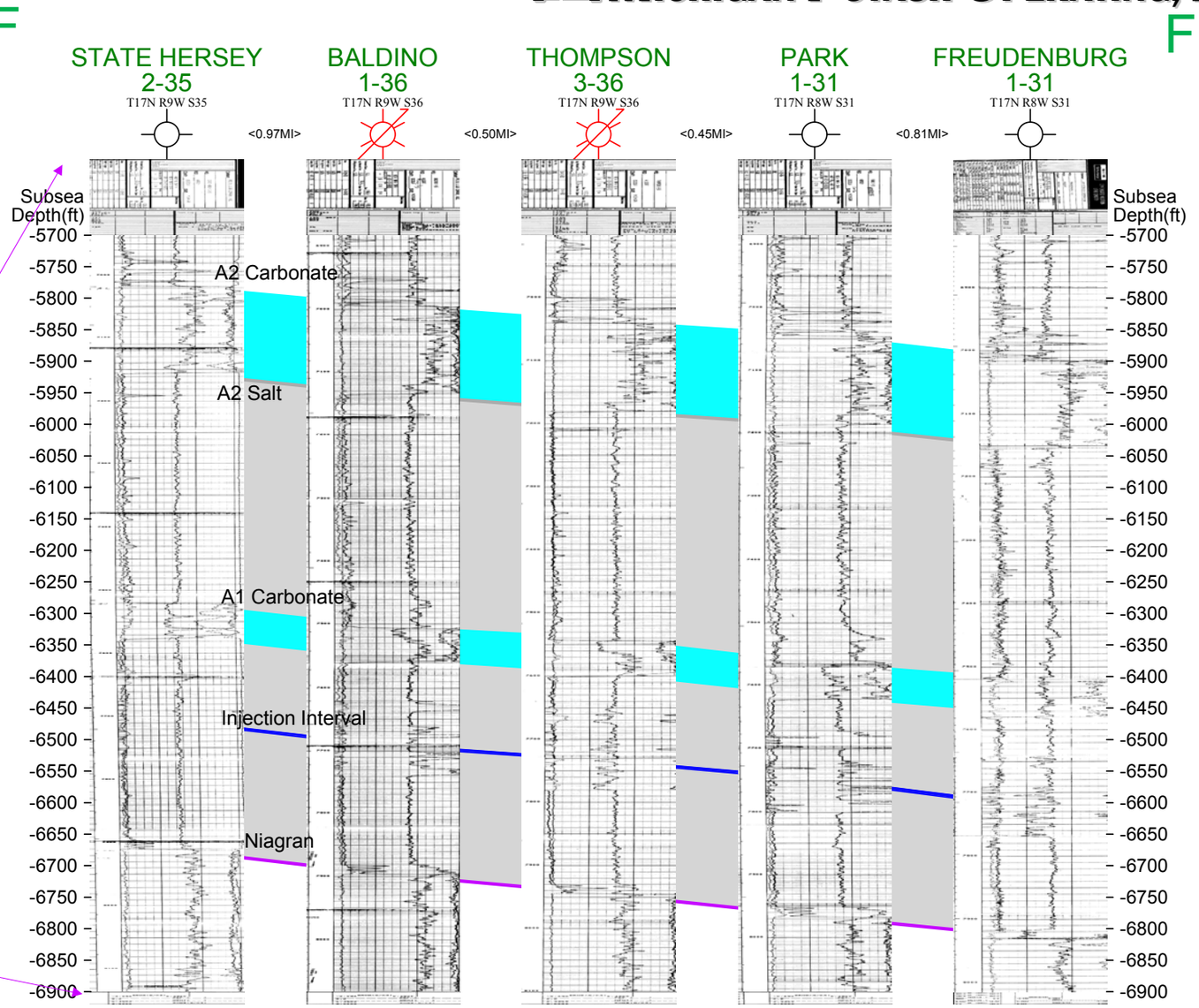
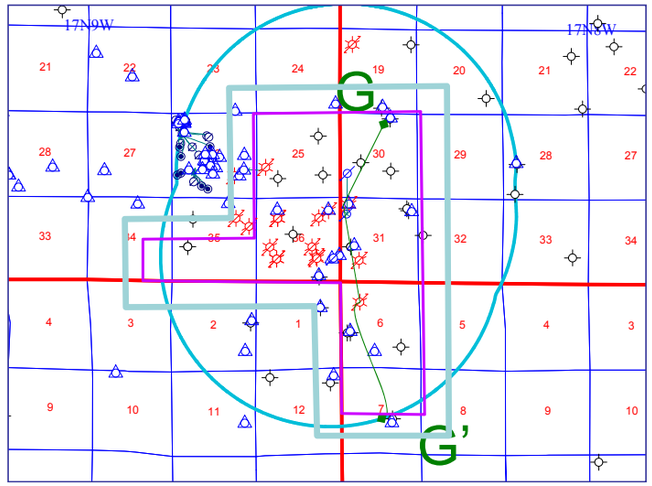
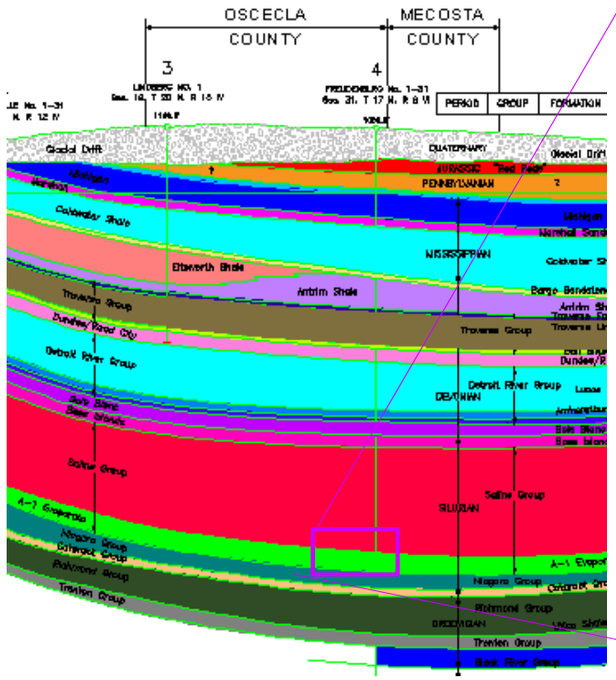


Figure F6 is a cross section through the AOR, showing the geological units of interest in the from the Salina A2 Carbonate to the base of the Niagran Carbonate. The Centerpoint of the proposed injection interval has been marked with a blue line. This shows the confining salt thickness above and below fluid introduction to the salt interval. The gradual basin dip, approximating 1.0 degree or 50' for every 1 mile can be observed from West to East. This cross section covers 3 miles from West to East, and 150' of vertical depth is obtained. There are no observable faults in the AOR.





MICHIGAN POTASH OPERATING, LLC

G

G'

WARK 1-30 T17N R8W S30

GRAY 1-31 T17N R8W S31

PARK 1-31 T17N R8W S31

JOHNSON ET AL 1-6 T16N R8W S6

STEIN 1-7 T16N R8W S7

<1.12MI>

<0.50MI>

<1.01MI>

<1.13MI>

Subsea Depth(ft)

-5700
-5750
-5800
-5850
-5900
-5950
-6000
-6050
-6100
-6150
-6200
-6250
-6300
-6350
-6400
-6450
-6500
-6550
-6600
-6650
-6700
-6750
-6800
-6850

A2 Carbonate

A2 Salt

A1 Carbonate

Injection Interval

Niagran

Figure F7 is a cross section through the AOR from North to South showing the geological units of interest in the from the Salina A2 Carbonate to the base of the Niagran Carbonate. The Centerpoint of the proposed injection interval has been marked with a blue line. This shows the confining salt thickness above and below fluid introduction to the salt interval. This cross section covers a 4 mile interval from North to South and the depth from North to south changes 50' in an upward fashion. There are no observable faults in the AOR.

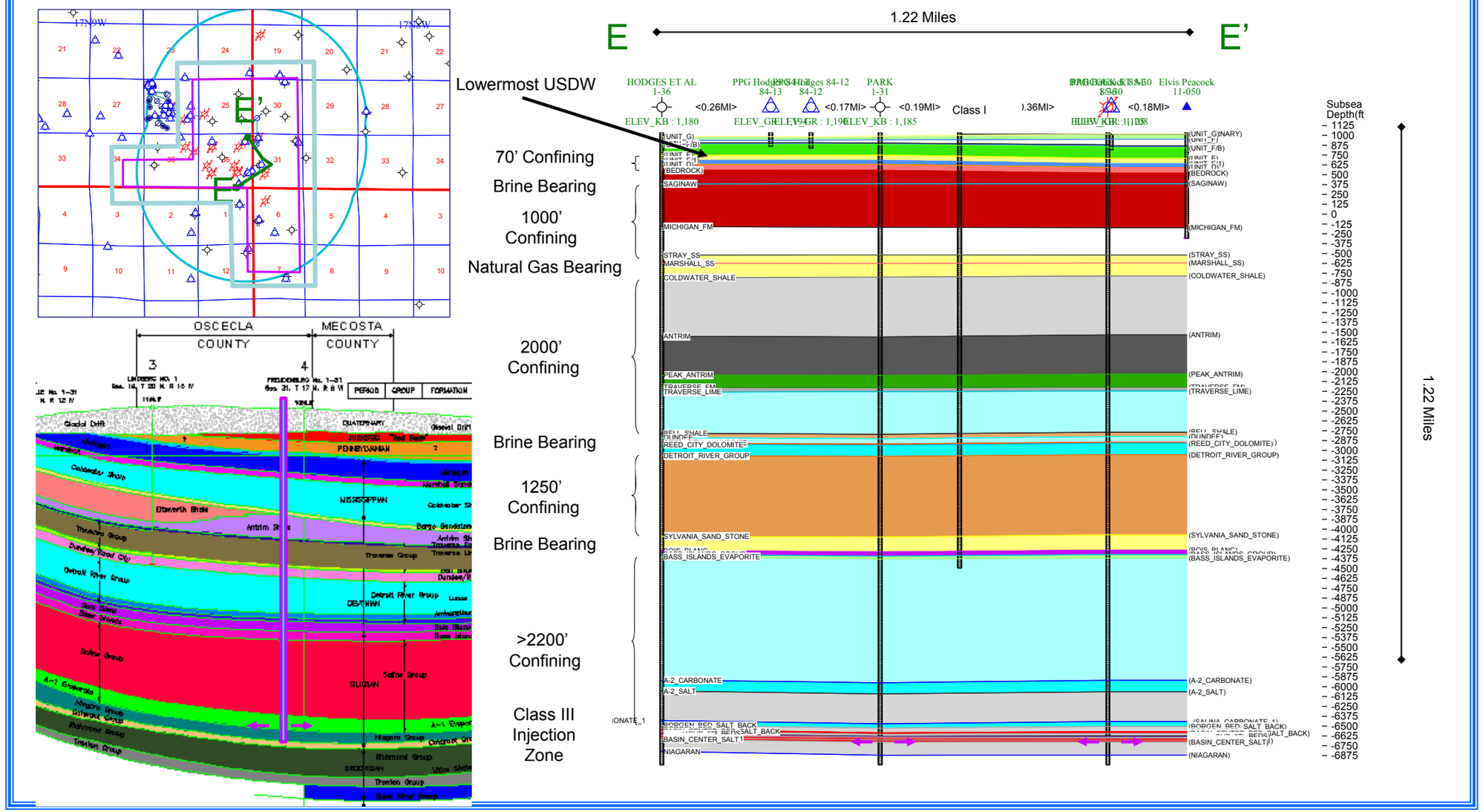
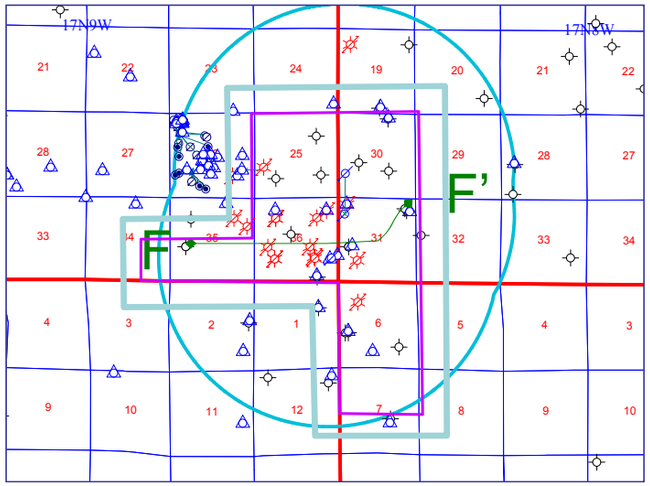


Figure F8 shows the USDWs in relation to the proposed injection zones in the immediate proximity of the AOR. The larger cross section is intentionally shown on a 1:1 ratio, with no vertical exaggeration to illustrate the amount of interlayered and non-permeable intervals between any potential injection zone and any potential USDW.



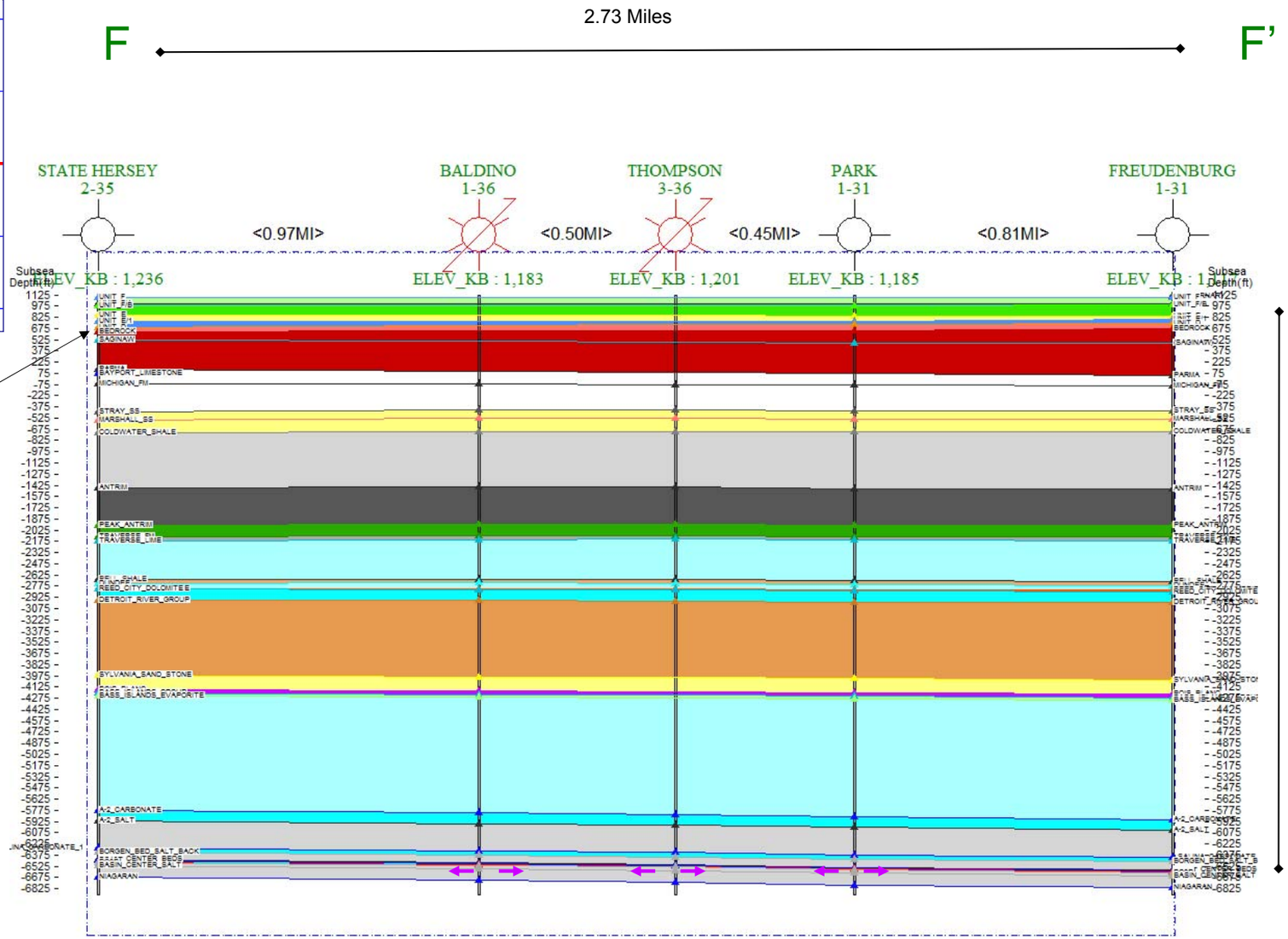


Figure F9 shows the USDWs in relation to the proposed injection zones in the across the entire AOR from North to South. This cross section is intentionally shown on a 1:1 ratio, with no vertical exaggeration to illustrate the amount of interlayered and non-permeable intervals between any potential injection zone and any potential USDW.

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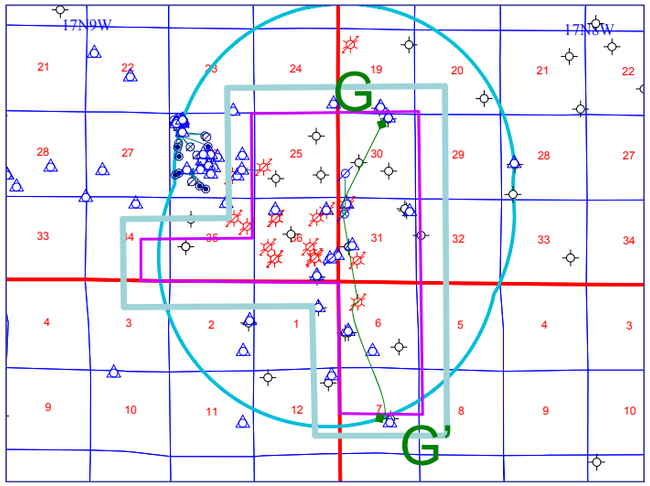


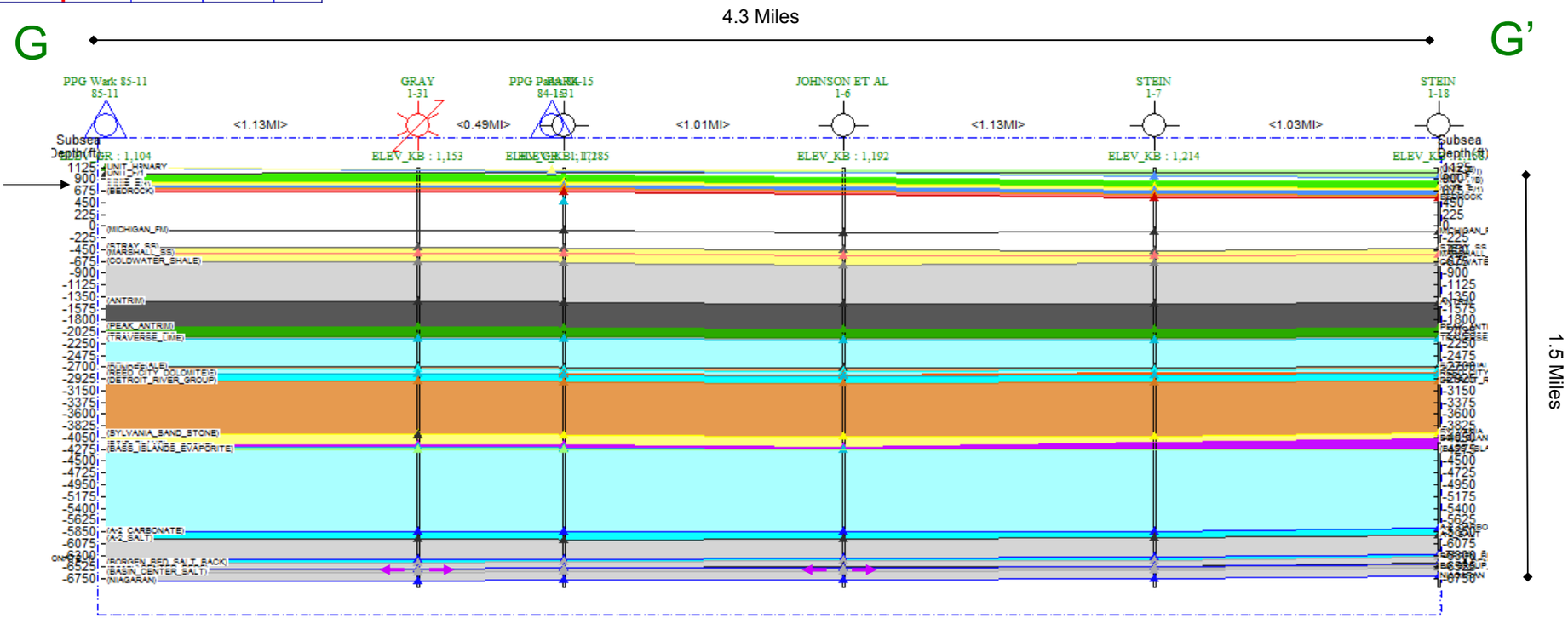


Figure F10 shows the USDWs in relation to the proposed injection zones in the across the entire AOR from North to South. This cross section is intentionally shown on a 1:1 ratio, with no vertical exaggeration to illustrate the amount of interlayered and non-permeable intervals between any potential injection zone and any potential USDW.

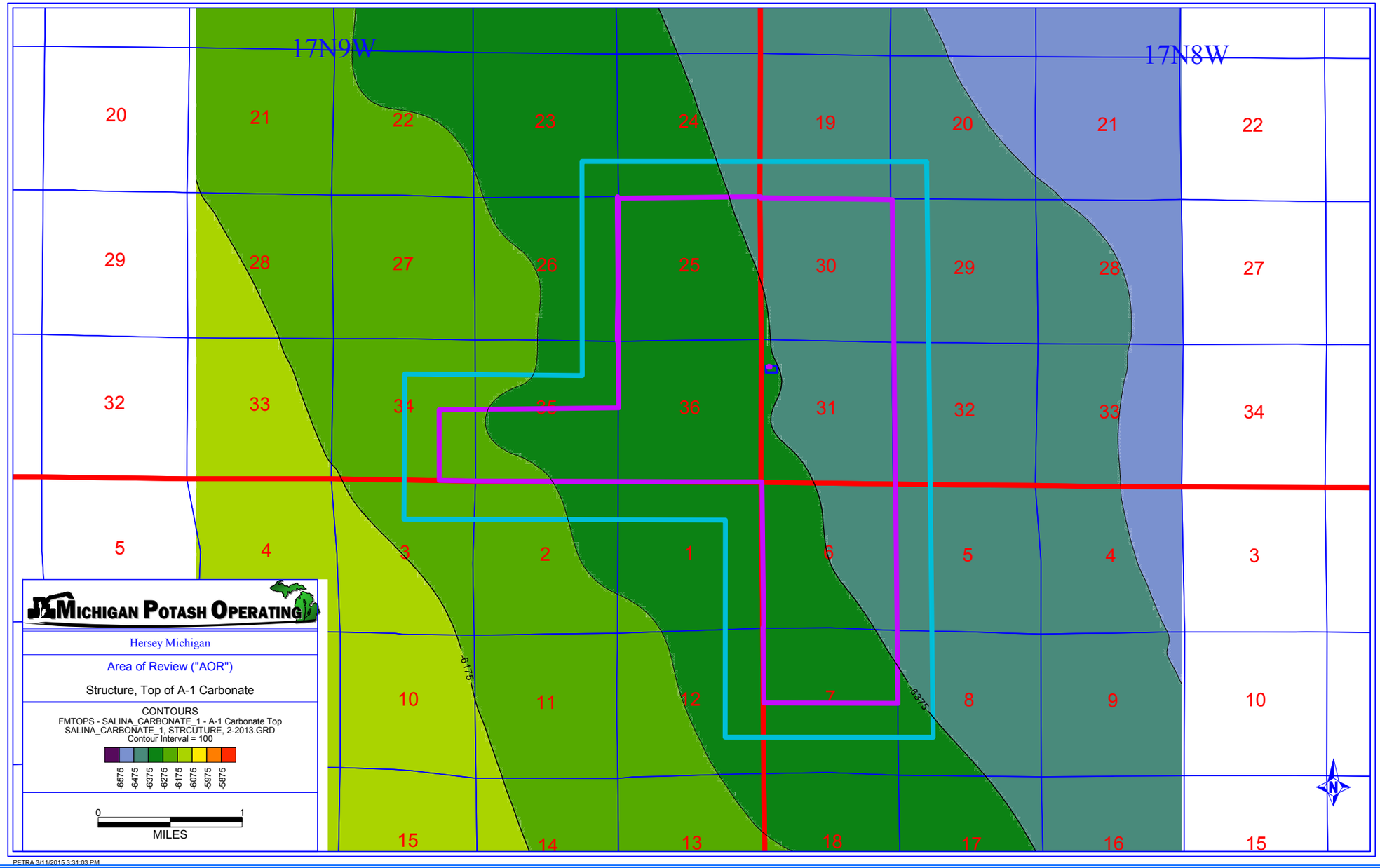


Figure F11. A Structure map of the A-1 Carbonate.

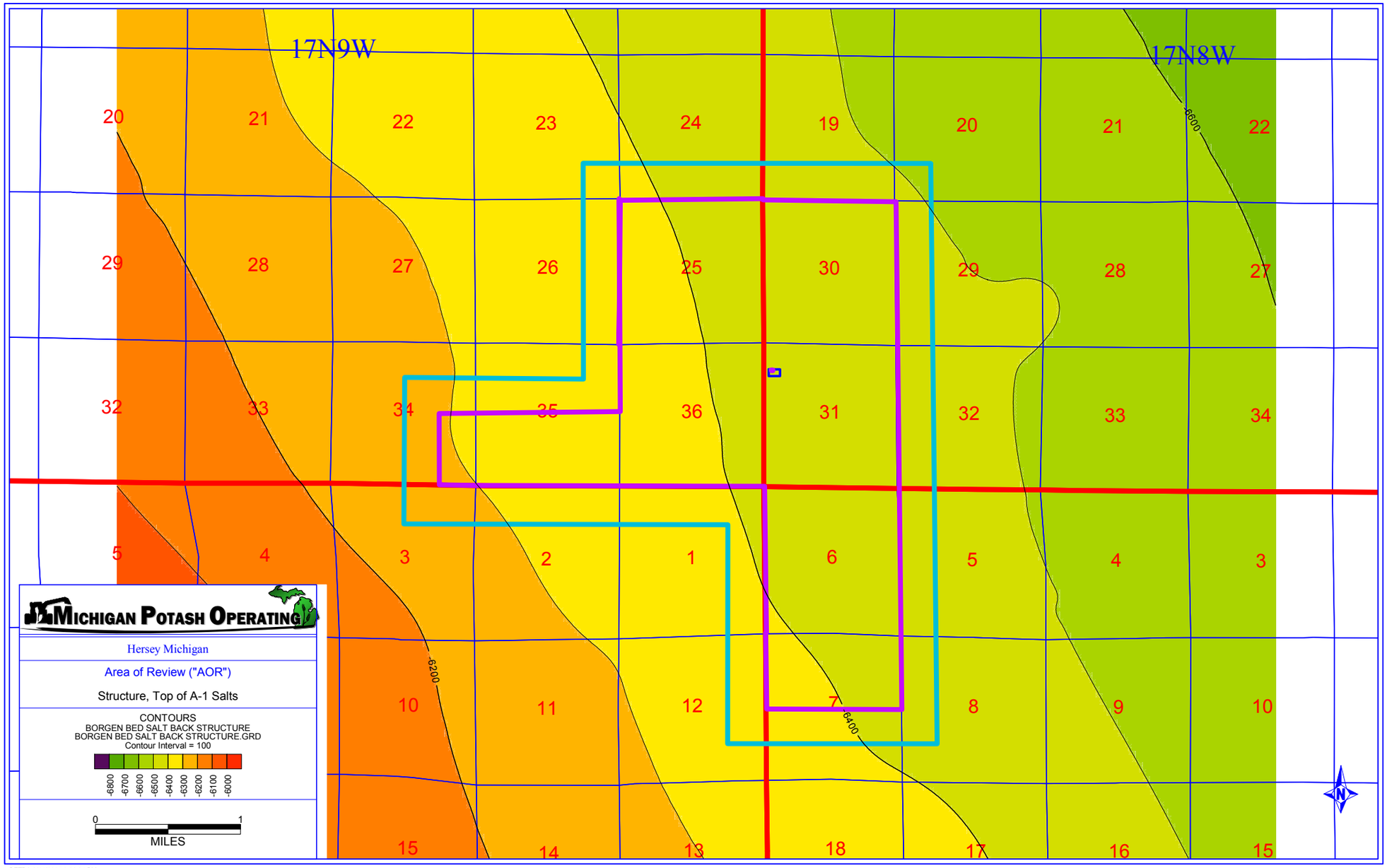


Figure F12. A structure map of the Salina A-1 Salts, which sit below the Salina A-1 Carbonate. This is the target injection horizon, which is 300' of massive bedded salt.

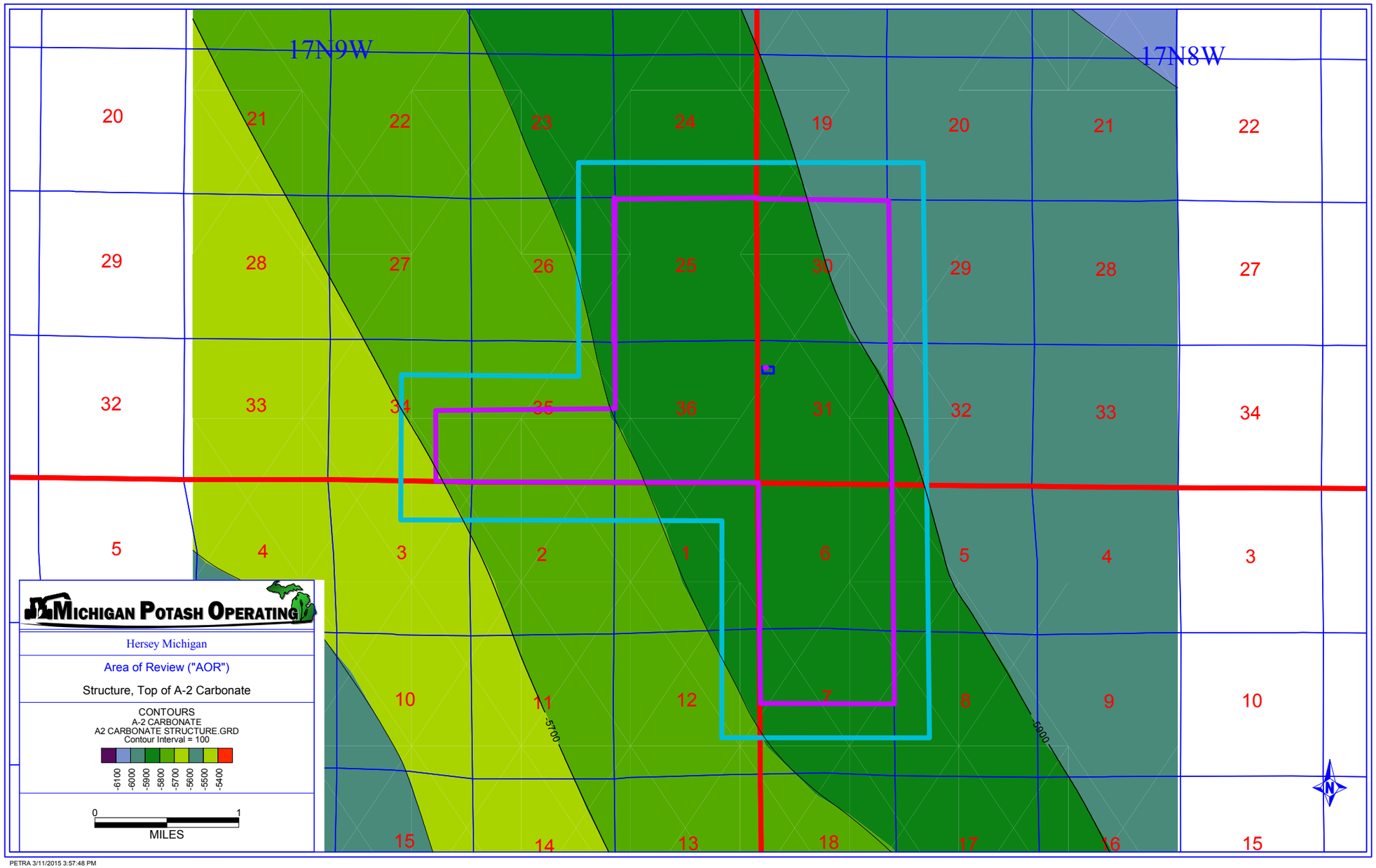


Figure F13. A structure map of the A-2 Carbonate.

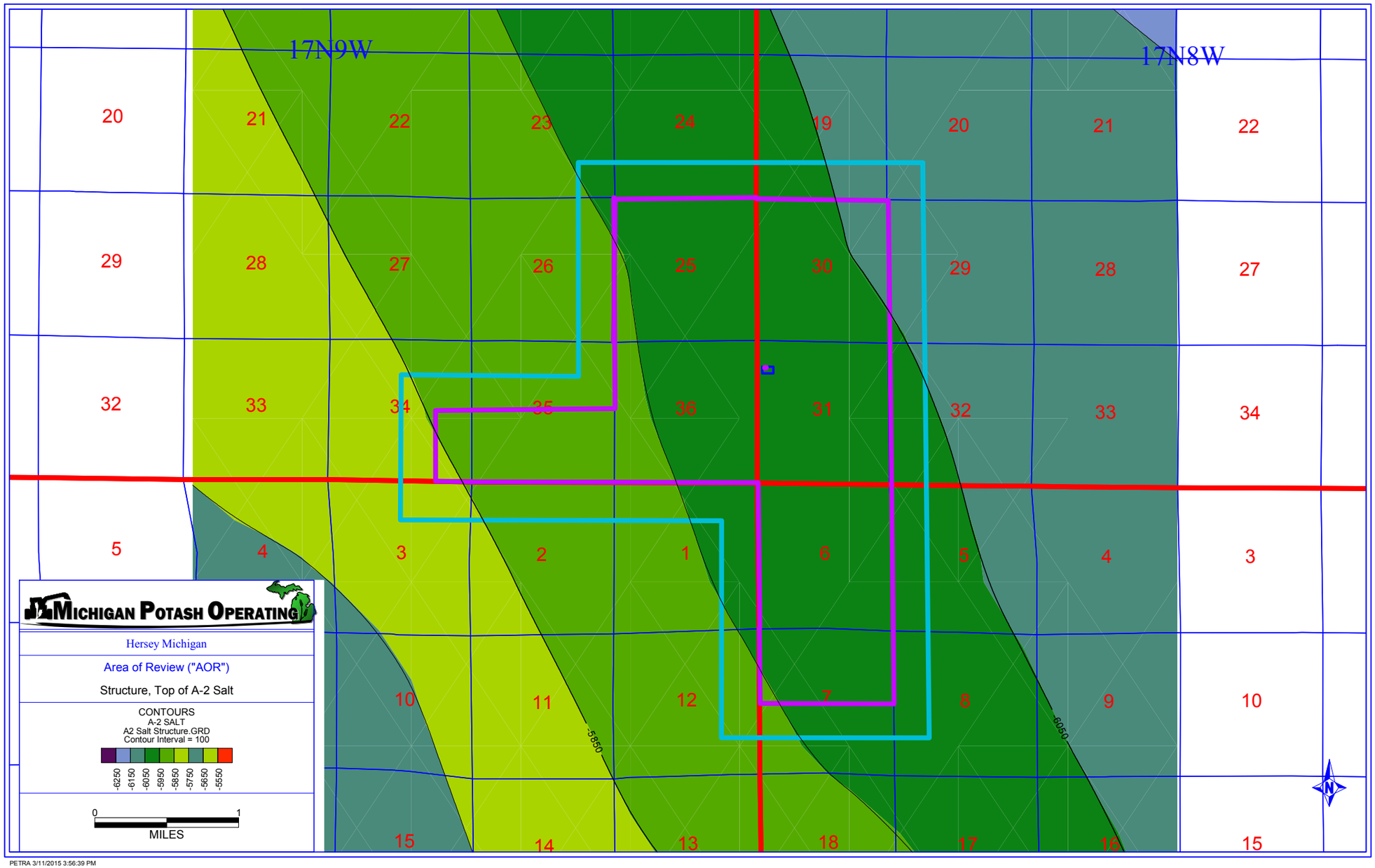


Figure F14. A structure map of the A2 Salt.

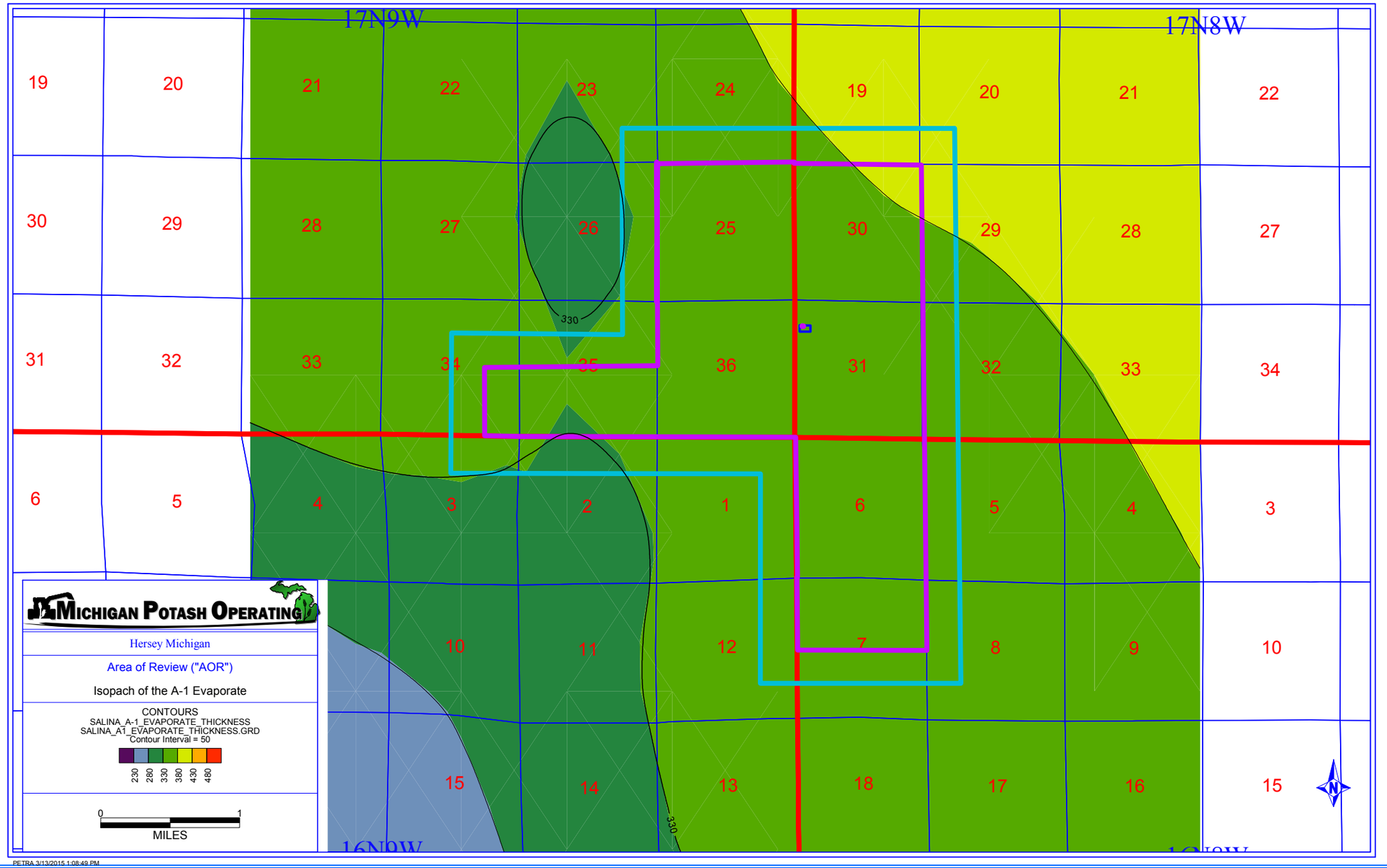


Figure F15. An isopach map of the Salina A-1 Evaporate.

CLASS III TYPE WELL

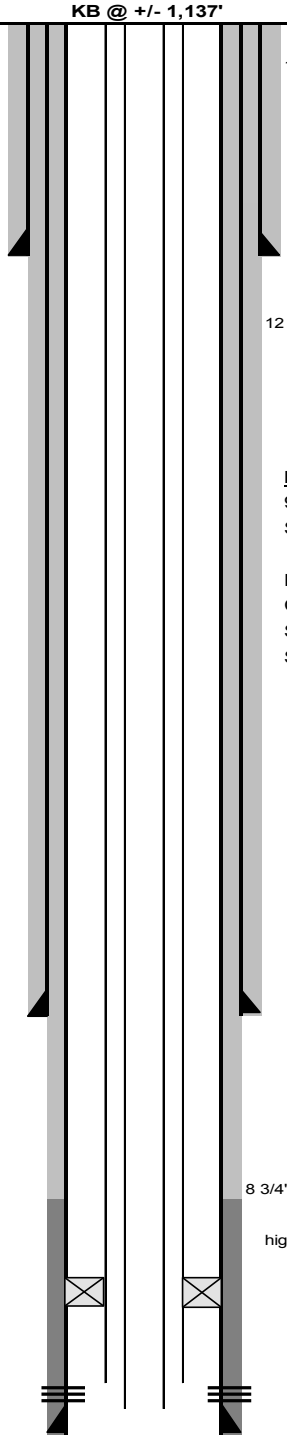
SURFACE: NW/4 SEC 31, T17N R08W
VERTICAL WELL
OSCEOLA COUNTY, MI

PROPOSED WELLBORE DIAGRAM

GL @ +/-1,124'
KB @ +/- 1,137'

UPDATED MAR 2015 BY TAP

Geological Zone	TVD	MD
Quaternary H	0	0
Quaternary G	0	0
Quaternary F1	59	59
Quaternary F	138	138
Quaternary E	323	323
Quaternary E/1	393	393
Quaternary D	439	439
Jurrasic Red Beds	515	515
Pennsylvantian		
Michigan	1205	1205
Marshall Sandstone	1650	1650
Coldwater Shale	1815	1815
Antrim Shale	2565	2565
Traverse Formation	3230	3230
Bell Shale	3800	3800
Dundee/Reed City	3860	3860
Detroit River Group	4090	4090
Amherstburg	4960	4960
Sylvania Sand Stone	5105	5105
Bois Blanc	5300	5300
Bass Islands Group Bass Island Evaporate	5355	5355
Salina Group	5725	5725
Salina A-2 Carbonate	7010	7010
A-2 Evaporate		
Salina A-1 Carbonate	7530	7530
A-1 Evaporate Roof	7590	7590
Class III Injection Interval	**7650**	**7650**
A-1 Evaporate Sump/Floor	7750	7750
Niagran	7940	7940



17 1/2" HOLE

SURFACE CASING
13-3/8" 54.5# J-55
SET @ 800'
Cement to Surface
320 SX 50/50 Poz and Lite, 1.47 Yield

12 1/4" HOLE DRILLED TO 5,500' (5,500 TVD)

INTERMEDIATE CASING
9 5/8# 40#-43# J-55
SET @ 5,500' MVD, TVD
At the Bass Island Evaporate Top (Below Dolomite)
DV Tool @ 3500'
Cement from Shoe to Surface
Stage 1: 240 SX 50/50 Poz-Class A, 1.24 Yield
Stage 2: 430 SX 14.2 LITE, 1.47 Yield

PRODUCTION CASING
7" 23-38# L-80
SET @ 7,850' MVD, TVD
In the Salina A-1 Evaporate
Cement from Shoe to Surface
LEAD: 850 SX 50/50 Poz-Class H, 1.36 Yield
TAIL (placed at bottom: 150 SX Class E HP)
or equivalent high compressive strength
20% Excess Design

PRODUCTION STRING(S)
4.5" 11.6# L-80 to Packer
Arrow set 10K differential Production Packer
SET @ 7500'.
4.5" 11.6# L-80 Tailpipe to 7750'
2 7/8" 6.5# L-80 EUE tubing to 7760'

8 3/4" HOLE DRILLED TO 7,850' (7,850 TVD)

high compressive strength cement TD to 7000'.

Select Perforations at Class III Injeciton Interval

PBTD = TD
TD @ +/- 7,850'

FIGURE F16.

The entire AOR will be developed with minimal surface disturbance via directional well drilling from central pad locations. Therefore, most Class III wells will have some degree of deviation, which is not reflected in Figure F16. Figure F17 below is a theoretical illustration of the proposed initial location, alongside the Quarter/Quarter Grid showing the NW4 of the NW4 of Section 31, Evart Township, Osceola County, Michigan.

Class III wells over the AOR will have deviation, provided they will be drilled centrally from a directional wellpad location. The amount and direction of the deviation will vary depending on the reach of each wellbore; however, the casing and cement design will not change; except for length of casing, and quantity of cement.

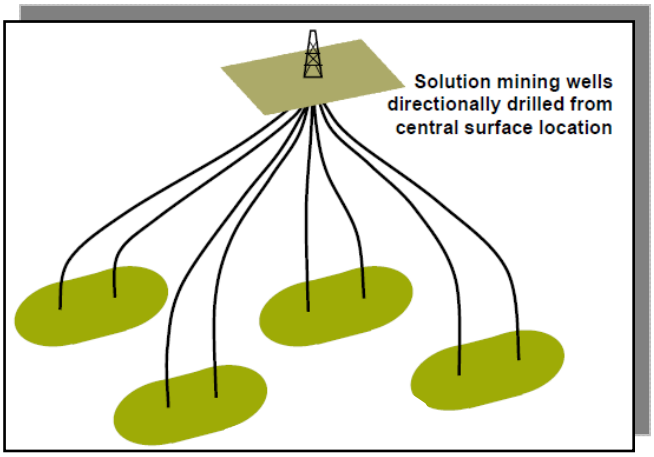


FIGURE F17. Class III multi-well pad design.

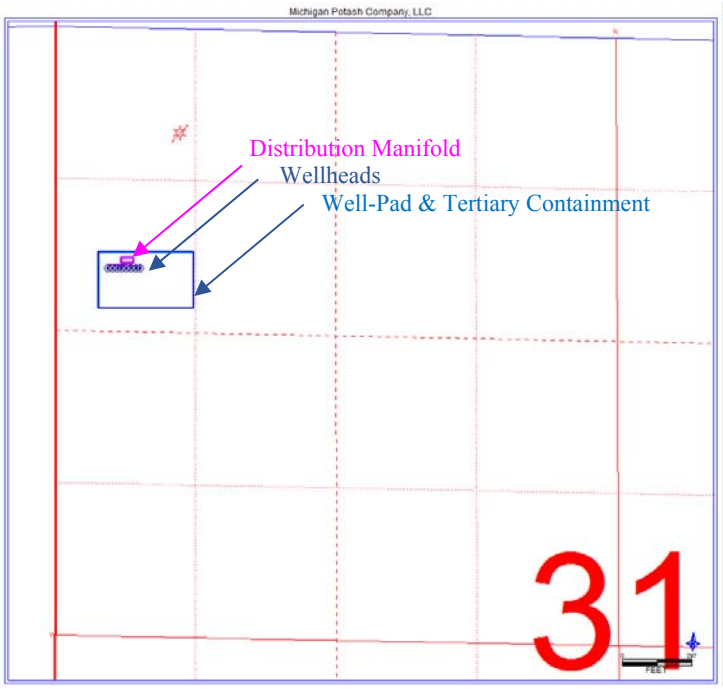


Figure F18 is a 8 ½ x 11" diagram showing well construction and corresponding site stratigraphy for a Typical Directional Reach "S"-Curve well as shown in Figure 17. This wellbore diagram shows the maximum anticipated reach, approximating 3,250', or 0.60 miles. This reach results in a 8,500' measured depth, 7,850 total depth wellbore.

Class III "S" wells like the one shown in Figure F18 will have varying throw based on the bottom hole target; however the principle design principles for all wells will remain the same as follows:

Surface Casing at 800'.
Kick-Off Point at 850'
Build Angle and Hold
Drop Angle to 0 degrees 150' above the A-1 Carbonate.
Straight hole to TD.

CLASS III TYPE WELL

DIRECTIONAL S-CURVE WELL

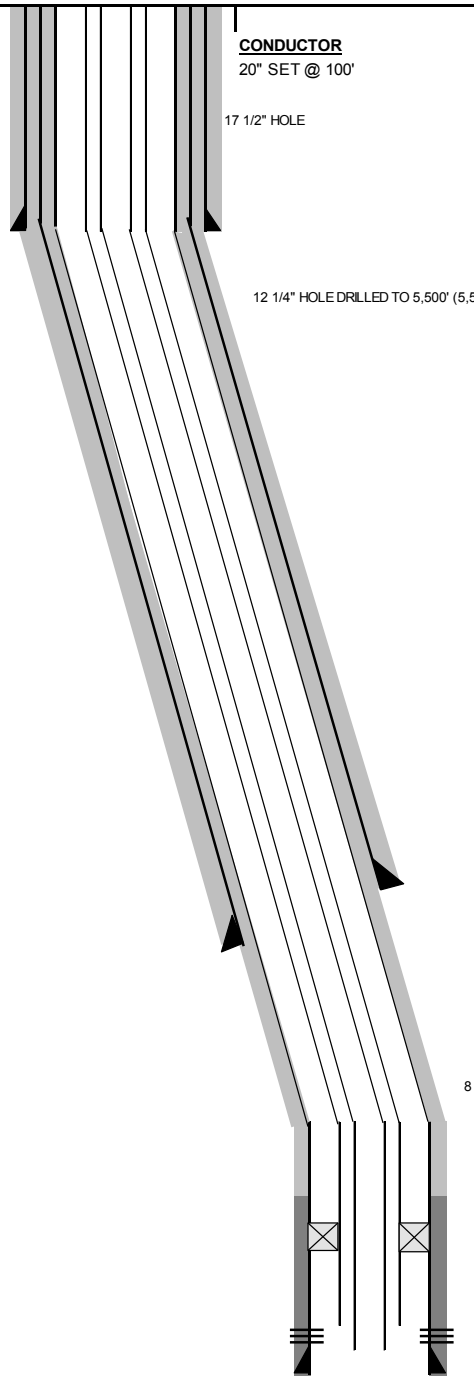
OSCEOLA & MECOSTA COUNTY, MI

Surface: Various, Bottom: Various

PROPOSED WELLBORE DIAGRAM

Geological Zone	TVD	MD
Quaternary H	0	0
Quaternary G	0	0
Quaternary F1	59	59
Quaternary F	138	138
Quaternary E	323	323
Quaternary E/1	393	393
Quaternary D	439	439
Jurrasic Red Beds	515	515
Pennsylvantian		
Michigan	1205	1350
Marshall Sandstone	1650	1720
Coldwater Shale	1815	1890
Antrim Shale	2565	2650
Traverse Formation	3230	3515
Bell Shale	3800	4150
Dundee/Reed City	3860	4215
Detroit River Group	4090	4560
Amherstburg	4960	5445
Sylvania Sand Stone	5105	5605
Bois Blanc	5300	5820
Bass Islands Group Bass Island Evaporate	5355	5885
Salina Group	5725	6300
Salina A-2 Carbonate	7010	7730
A-2 Evaporate		
Salina A-1 Carbonate	7530	8280
A-1 Evaporate Roof	7590	8340
Class III Injection Interval	**7650**	**8400**
A-1 Evaporate Sump/Floor	7750	8500
Niagran	7940	8700

UPDATED MAR 2015 BY TAP



CONDUCTOR
20" SET @ 100'

17 1/2" HOLE

SURFACE CASING
13-3/8" 54.5# J-55
SET @ 800'
Cement to Surface
450 SX 50/50 Poz and Lite, 1.47 Yield

12 1/4" HOLE DRILLED TO 5,500' (5,500 TVD, 6,050 MD)

INTERMEDIATE CASING
9 5/8# 40#-43# J-55
SET @ 6,050' MVD, 5,500 TVD
At the Bass Island Evaporate Top (Below Dolomite)
DV Tool @ 4000' MD
Cement from Shoe to Surface
Stage 1: 520 SX 50/50 Poz-Class A, 1.47 Yield
Stage 2: 1000 SX 14.2 LITE, 1.47 Yield

PRODUCTION CASING
7" 23# L-80
SET @ 8,600' MVD, 7,750' TVD
In the Salina A-1 Evaporate
Cement from Shoe to Surface
LEAD: 920 SX 50/50 Poz-Class H, 1.47 Yield
TAIL (placed at bottom: 150 SX Class E HP), 1.15 Yield
or equivalent high compressive strength
20% Excess Design

PRODUCTION STRING(S)
4.5" 11.6# L-80 to Packer
Arrow set 10K differential Production Packer
SET @ 8,250' MD, 7,500 TVD,
2 7/8" 6.5# L-80 EUE tubing to 8,450 MD 7750' TVD

8 3/4" HOLE DRILLED TO 8500' MD (7,850 TVD)

high compressive strength cement 8200' MD.

Select Perforations at Class III Injeciton Interval

PBTD = TD
TVD @ +/- 7,850'
MD @ 8,600'

FIGURE F18.

F.3 USEPA Region V Checklist Items

- **Cross-section and structural contour maps adequate to describe the regional geology of the area including especially any faults**

  Please refer to attached Figures F3, F6-F13.
  There is no indication of faulting within the region.

- **Cross-sections of site-specific geology including any faulting in the AOR**

  Please refer to attached Figures F3, F6-F13.
  There is no indication of faulting within the AOR.

- **Geologic description of the confining zone (including lateral extent, lithologies, thickness, permeability's, porosities, extent of natural or induced fractures, etc.)**

  Please refer to Figures F5.
  There is no documented evidence of any natural or induced fractures in the area.

- **Geologic description of the injection zone (including depth, lateral extent, lithology, thickness, permeability, porosity, presence of natural or induced fractures, etc.)**

  Please refer to Figures F6-F8.
  There is no documented evidence of any natural or induced fractures in the area.

- **Diagram showing well construction and corresponding site stratigraphs**

  Please refer to Figure F16 and Figure F18.

US EPA UIC PERMIT APPLICATION FORM 7520-6

Sodium and Potassium

CLASS III

ATTACHMENT G: GEOLOGICAL DATA ON INJECTION AND CONFINING ZONES (CLASS II)

DOES NOT APPLY TO CLASS III WELLS

THE UNITED STATES POTASH PROJECT
APRIL 2015

US EPA UIC PERMIT APPLICATION FORM 7520-6

Sodium and Potassium

CLASS III

ATTACHMENT H: OPERATING DATA

THE UNITED STATES POTASH PROJECT
APRIL 2015

ATTACHMENT H.
OPERATING DATA

EPA instruction, form 7520-6 (2011):

OPERATING DATA - Submit the following proposed operating data for each well (including all those to be covered by area permits: (1) average and maximum daily rate and volume of the fluids to be injected; (2) average and maximum injection pressure; (3) nature of annulus fluid; (4) for Class I wells, source and analysis of the chemical, physical, radiological and biological characteristics, including density and corrosiveness, of injection fluids; (5) for Class II wells, source and analysis of the physical and chemical characteristics of the injection fluid; (6) for Class III wells, a qualitative analysis and ranges in concentrations of all constituents of injected fluids. If the information is proprietary, maximum concentrations only may be submitted, but all records must be retained.

H.1 Average and Maximum Daily Rate and Volume of Fluids to be Injected

Injection may occur to a single well or to all applicant wells simultaneously, thereby reducing or changing the injected rate and volume per well. Maximum instant rates and volumes are not expected to exceed the following, per well. In the case of Class III wells, provided all injection volumes equals extraction volume, injection volume will be the limiting threshold.

Average Rate	Maximum Rate	Average Volume	Maximum Volume
gpm	gpm	gpd	gpd
300	500	435,000	720,000

Further detail concerning the injection practices and rate variations over time can be referenced in Attachment K.

H.2 Average and Maximum Injection Pressures

Injection pressure limitations are is utilized to inhibit fracturing of the confining intervals of the injection horizon in conventional injection circumstances.

The Injection horizon is a non-porous, bedded salt, with visible laminations. Unlike non-salt formations, it is critical to maintain pressure on salts at all times, in excess of stress and strain created by overburden to ensure tensile stresses do not create fractures in the confining roof.

Keeping the injection pressure too low will result in cracks in the salt roof.

During production operations, there is always one injector and one producer. Therefore, the injected volume approximates the withdrawal volume 1:1. This inhibits the possibility of fracture generation or growth when the incompressible fluids follow the path of least resistance from injector to extraction and back to surface, rather than creating fractures. Injected volumes are accounted for on the return. This insures that fluids are not being lost to a fracture in a confining interval.

In the case of salt solution injection, it is important that injection pressures are set to maintain a steady and preferred bottom hole pressure.

Tubing friction losses for 4.5" moderately worn pipe, will approximate .1321 psi/ft or 1030 psi at 7800' for moderately worn pipe at 500 gpm.

Injection Rate gpm	Friction Loss Psi @ 7800'
350	530
500	1010

Targeted bottom hole pressures are calculated as follows:

Pressure gradient for fresh water (psi/ft) * specific gravity of water * bottom hole depth + surface pressure – friction loss = Bottom Hole Pressure;

Where bottom hole pressure is not to exceed 0. 8 psi/ft, as the fracture gradient as utilized from Area Permit MI-133-3G-A0002.

Injection fluid may be water (specific gravity of 1.0) or a partially saturated sodium chloride/potassium chloride brine solution with a specific gravity of 1.2.

Therefore; when the operation is injecting fresh water, the average and maximum anticipated injection pressure should be as follows:

	Average Rate gpm	Maximum Rate gpm	Hydrostatic Column @ 7650 psi	Average Friction psi	Maximum Friction psi	Target Bottom Hole Pressure <=0.8 psi/ft psi	**Average Injection Pressure psi**	**Maximum Injection Pressure psi**
SG = 1.0	350	500	3312.5	540	1030	6120	**2000**	**3347.5**
SG = 1.2	350	500	3975	540	1030	6120	**2000**	**2685.0**

H.3 Nature of Annulus Fluid

The 4.5" x 7" annulus is filled with either freshwater or partially saturated brine with a specific gravity of 1.1.

H.4 For Class III wells, a qualitative analysis and ranges in concentrations of all constituents of injected fluids. If the information is proprietary, maximum concentrations only may be submitted, but all records must be retained. Source and analysis of the chemical, physical, radiological and biological characteristics, including density and corrosiveness, of injection fluids;

The principle stream injected into the proposed Class III wells is fresh water. Representative samples from the AOR are presented here in a *quantitative measured means below*:

		Well 1	Well 2	Well 3	Well 4	Well 5	Well 6	Well 7
Calcium	mg/I	65	146	76	74	11	83	110
Magnesium	mg/L	38	61	39	37	34	37	46
Sodium	mg/L	6.07	7.08	11	5.98	5.49	10.8	6.1
Potassium	mg/L	1.1	1.92	1.B6	0.41	1.33	3.46	0.72
Bicarbonate	mg/L	172	230	230	253	139	241	345
Carbonate	mg/L	10	10	10	10	10	10	10
Sulphate	mg/L	19.2	21.2	29.6	19.6	12.4	26.4	21.2
Chloride	mg/I	7.5	10.8	17.5	4.5	3	18	3.9
Iron	mg/L.	0.4	2.49	1.22	0.53	3.93	0.63	0.64
Manganese	mg/1	0.01	0.19	0.04	0.01	0.04	0.01	0.03
Nitrate as N	mg/L	7.4	5.1	6.3	1.6	1	5.3	5.4
Total Phosphorous as P, mg/L	0.01	0.29	0.073	0.023	0.06	0.033	0.047	
PH	7.2	6.9	6.8	7	7	6.2	6.8	
Specific Conductivity, uahos/cm@25C	559	561	666	552	476	651	7B5	
Sum of Ions,mg/L	319	491	416	404	329	430	543	
Total Hardness, mgiL as CaCO3	317	616	349	335	315	35S	462	
Sum of cations, epm	6.62	12.67	7.49	6.97	6.57	7.73	9.52	
Sum of Anions,epm	3.88	4.93	5.32	5.04	3.79	5.43	6.63	

The fresh water generates a naturally saturated brine that is sent to a natural gas fired evaporator, which concentrates the salt and potash water. The concentration of the water, crystallizes the salt from solution, and increases the concentration of the potash in the water. The water is then sent to potash crystallization processes, where temperature contrasts crystallize the potash from the water. The remaining water is recycled back for injection. Water of this nature has the following principle *qualitative* properties and elemental constituents:

	Range	Typical
Specific Gravity	1.0 - 1.2	1.10
pH	6.5 - 8.0	7.0

Chemical Characteristics:

Component	Amount	
H_2O	variable	
NaC1	5 to 15.0	wt%
KC1	0.5 to 2.0	wt%
SO_4	<0.4	wt %
Br	<0.2	wt %
Ca	<0.2	wt %
Mg	<0.02	wt %

Provided the Class III process is generating food grade salt utilized on dinner tables across the world, Sodium Chloride (NaCl), i.e. table salt or "salt", and potassium chloride (KCl) "potash", which is a natural, food safe fertilizer, applied to staple crops for food generation and consumption, the Class III process produces only clean fluid characteristics.

Very minor, and mostly undetectable amounts of sodium bisulfate may be introduced into this water for the purpose of corrosion control and oxygen scavenging. Minor amounts of natural gas condensate may be injected into the wells on a batch basis as needed to maintain an inert pad during the injection and withdrawal processes. Fluids returning from the wells will flow through a pipe to the brine holding tank and into the circulating system.

Biological Characteristics:

The injection water from food grade salt and potash is essentially free of biological matter.

Radiological Characteristics:

The radiological character of the recycled water will contain trace amounts of the naturally occurring stable Cl 37 isotope and radiogenic K40 isotope associated with potassium chloride and sodium chloride. These are naturally occurring traces and not harmful to people, animals, or plant life. Potash is intentionally placed on crops to increase health and growth. Sodium chloride is intentionally placed in food sources.

H.5 A Representative Waste Analysis (including all major constituents and, for hazardous wastes. all hazardous constituents and characteristics)

There are no hazardous wastes associated with the proposed operation.

H.6 Plans for Corrosion Monitoring (if the waste is corrosive)

The injection stream is not particularly corrosive, unless oxygen is introduced inadvertently into the process stream.

Corrosion coupons, and real time monitoring of oxygen content, will be utilized to monitor any potential corrosion associated with the injection fluids. Historical testing has suggested less than 10 millimeters/year of corrosion/erosion to carbon steel. Over 30 years of successful food grade salt and potash processing within the immediate area has led to an extensive knowledge of the appropriate selection of materials of construction and steps that need to be taken to prevent equipment wear and corrosion. The annulus fluid in each injection well will be composed of inhibited brine.

Injection pressures will be monitored real time via pressure transducers.

Pressure transducers on the annulus of each injection well will be monitored real time.

Each injection well will be equipped with continuously recording measurement devices to monitor the injection pressure, flow rate and volume, and the pressure on the annulus between the tubing and the long string of casing. All brine injection will be through the tubing. If leakage were to develop in the tubing string or packer as a result of corrosion, it will be detected by noting a rise in the annulus pressure.

It is intended that when possible, all injection lines will be above ground, insulated, and heat traced, rather than buried, which enables a more proficient daily monitoring of any potential leak and corrosion.

US EPA UIC PERMIT APPLICATION FORM 7520-6

Sodium and Potassium

CLASS III

ATTACHMENT I: FORMATION TESTING PROGRAM

THE UNITED STATES POTASH PROJECT
APRIL 2015

ATTACHEMENT I.
FORMATION TESTING PROGRAM

EPA instruction, form 7520-6 (2011):
FORMATION TESTING PROGRAM - Describe the proposed formation testing program. For Class I wells the program must be designed to obtain data on fluid pressure, temperature, fracture pressure, other physical, chemical, and radiological characteristics of the injection matrix and physical and chemical characteristics of the formation fluids.

For Class II wells the testing program must be designed to obtain data on fluid pressure, estimated fracture pressure, physical and chemical characteristics of the injection zone. (Does not apply to existing Class II wells or projects.)

For Class III wells the testing must be designed to obtain data on fluid pressure, fracture pressure, and physical and chemical characteristics of the formation fluids if the formation is naturally water bearing. Only fracture pressure is required if the program formation is not water bearing. (Does not apply to existing Class III wells or projects.)

I.1 Procedures to verify depth of lowermost USDW:

Over 308 hydrological test holes and approximately 60 piezometers cataloging over 33,833 feet of groundwater and soil data was amalgamated for the purposes of adequately understanding and protecting groundwater within the Michigan Potash Operating AOR, specifically to the proposed area of injection, including detailed geological cross section and a subsurface understanding of the deposits and the water they contain.

The proposed injection wells are being drilled immediately within the vicinity of well mapped depths of the USDW.

A cross section across the entire Class III AOR has been developed, so as to identify the already known depths at which the USDW will occur. Therefore, the approximate depth, within +/- 10’ can be predetermined before drilling the any proposed injection wells.

Figure D4 through Figure D10 have been generated for the sole purpose of identifying the lowermost USDW before drilling commences.

The AOR has control wells in all four directions. **Figures D5 through D8** are cross sections showing the anticipated depths of the Quaternary aquifer sources, including the lower most USDW.

Further while drilling, the following procedures shall be followed to verify the lowermost USDW:

1. While drilling with fresh water system to the surface casing point: A) monitor all returns B) grab samples every 50’ from 0 to 600’ and bag. Watch for Jurassic Red-Bed cuttings to return to surface at +/- 550’ measured depth. Following red beds and cutting samples until bedrock is verified.

It is regulatory standard to drill adequately below the bedrock before setting surface casing.

I.2 Procedures to obtain extrapolated formation pressure in porous and permeable zones within approximately 500 feet of the top of the injection zone (non-hazardous wells) or injection interval (hazardous wells):

As per **Figure F8**, there are virtually no porous or permeable intervals until 5,470', which is 2,180' above the Salina A-1 Evaporate, the top of the proposed injection horizon and outside of the EPA guidance.

As per **Figure B1-B4**, there are over 30 well control points in and just outside of the AOR, making the geological control and pressure information over the AOR extensive.

I.3 Sampling and analysis procedures for formation fluid of: 1) the first aquifer overlying the confining zone (hazardous and non-hazardous wells); 2) the injection zone (non-hazardous wells) or injection interval (hazardous wells); and 3) the containment interval (hazardous wells only).

1) As per section D.4 and I.2, there are no aquifers overlying any of the confining zones that warrant individual testing as they are all highly saline, contain natural gas, sour gas, or oil. The nearest interval above the Class III interval is the Bass Island Dolomite, which is a proposed Class I Non-hazardous disposal interval with the following water characteristics:

The Midwest Regional Carbon Sequestration Partnership successfully applied over 24 Million dollars, 18 million of which was via the Department of Energy, into the geologic and rock fluid capacities of the Bass Island Dolomite (http://www.mrcsp.org). The Bass Island Fluid Chemistry is as follows as follows:

Property	Result
pH	6.91
Color	light brown
Specific gravity	1.2275
Specific conductance	188,000 microohms/crn @ 25°C
Viscosity	18 centipoise @ 23°C

Constituent	Concentration
Calcium	58,500 mg/l
Magnesium	7498 mg/l
Potassium	8982 mg/l
Sodium	31,100 mg/l
Barium	2 mg/1
Boron	135 mg/1
Iron	1 mg/1
Manganese	6 mg/I
Silica	1 mg/1
Strontium	2130 mg/l
Bicarbonate	220 mg/l
Carbonate	<1 mg/1
Bromide	1744 mg/l
Chloride	203,400 mg/l
Fluoride	0.4 mg/1
Iodide	28 mg/1
Nitrate	<0.1 mg/1
Sulfate	198 mg/1
Total dissolved solids	365,000

1.4 Cores and laboratory core testing for confining and injection intervals (for non-hazardous waste wells, a minimum of one 30-foot core of the confining zone and one 30-foot core of the injection zone; for hazardous wells where injection of restricted waste is proposed, one or more cores of the confining interval).

The subject AOR is one the world's foremost collections of evaporate core in the Silurian age Salina A-1; gather between 1980 and 2000 during the exploration, delineation, and development of the subject potash and salt.

The table below is a core inventory of the Salina A-1 salt; which by operational means, is both the injection and confining interval.

Each well has been extensively examined and studied over the course of prior operations and extensively by Michigan Potash Operating, the Michigan Geological Survey, and Western Michigan University, since the relinquishment of this core in the year 2008. The following catalogue of cores across the AOR, or in the near vicinity of the AOR have been reviews.

County	Sec	Twp	Rng	Operator	Well name	Aggregate Footage	API	Permit	Mindex
Osceola	19	17N	8W	P P G OIL AND GAS CO INC AND AMOCO PRODU	VUKIN UNIT 1-19	7658-7709	21133384630000	38463	
Osceola	28	17N	8W	WILLMET INC	MCCLAIN 1-28	7647-7783;	21133364260000	36426	
Osceola	30	17N	8W	Willmet	WARK 1-30	7591-7672; 7737-7844; 8134-8219	21133359770000	35977	
Osceola	31	17N	8W	Jem Petroleum	FREUDENBURG 1-31	9560-9726	21133345580000	34558	
Osceola	31	17N	8W	Jem Petroleum	FREUDENBURG 1-31A	7705-7721; 7735-7932; 8118-8179	21133345580100	34852	
Osceola	31	17N	8W	Marathon Oil Co.	GRAY 1-31	7593-7854; 9564-9586	21133358000000	35800	
Osceola	31	17N	8W	Marathon Oil	PARK 1-31	7626-7770	21133363360000	36336	
Osceola	13	17N	9W	Marathon Oil Co. OIL CO	COMPTON 1-13	7522-7609	21133365060000	36506	
Osceola	22	17N	9W	P P G OIL AND GAS CO INC	STOREY 1-22	7413-7427; 7443-7505	21133368430000	36843	
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	Kalium 1011	7509-7692;	21133003487000	00348	M0348
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	THOMAS 1-26	7506-7619	21133003507000	00350	
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	Kalium 1041	7763-7806;	21133003667000	00366	M0366
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	Kalium 1042	7797-7821; 7835-7975	21133003787000	00378	M0378
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	Kalium 1052	7727-7811; 7840-7875	21133003797000	00379	M0379
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	Kalium 1051	7674-7762;	21133003807000	00380	M0380
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	Kalium 2031	7676-7763	21133003837000	00383	M0383
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	Kalium 2061	7740-7828	21133003847000	00384	M0384
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	Kalium Hersey 1013	7517-7570;	21133003857000	00385	M0385
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	Kalium Hersey 1054	7665-7678; 7681-7746; 7860-7863	21133003877000	00387	M0387
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	Kalium Hersey 1044	7900-7958;	21133003917000	00391	M0391
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	Kalium Hersey 1031	7735-7848; 7851-7868; 1771-7875;	21133003947000	00394	M0394
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	Kalium Hersey 1032	7839-7856; 7862-7898;	21133003977000	00397	M0407
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	Kalium Hersey 1014	7694-7753;	21133004037000	00403	M0413
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	Kalium Hersey 2032	7626-7680	21133004087000	00408	M0418
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	Kalium Hersey 2062	7735-7780	21133004097000	00409	M0419
Osceola	26	17N	9W	MOSAIC USA LLC DBA MOSAIC POTASH HERSE	Kalium Hersey 2081	7572-7594; 7599-7600; 7604-7632; 7660-7663;	21133004377000	00437	M0447
Osceola	26	17N	9W	MOSAIC USA LLC DBA MOSAIC POTASH HERSE	Kalium Hersey 2082	7230-7282; 7480-7529; 7540-7641; 7657-7687; 7692-7	21133004387000	00438	M0448
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	THOMAS 1-26	7506-7619	21133366007000	36600	M0350
Osceola	26	17N	9W	Wilmet, Incorporated	THOMAS 1-26	7506-7619	21133366000000	36600	M4979
Osceola	26	17N	9W	P P G OIL AND GAS CO INC AND MILLER BROS	WOODWARD ET AL 1-26	7561-7641	21133369420000	36942	
Osceola	26	17N	9W	MCCOOL JOHN E	PAINE 1-26	7513-7599	21133373170000	37317	
Osceola	26	17N	9W	Marathon Oil Co. OIL CO	MILLER 1-25	7699-7787	21133375190000	37519	
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	KH 1010	7728-7734			
Osceola	26	17N	9W	PPG Oil & Gas Company, Incorporated	Thomas 1-26B	7983-8033			M4978
Osceola	26	17N	9W	Mosaic USA dba Mosaic Potash Hersey LLC	Thomas 3-26	7496-7539; 7556-7695			M5010
Osceola	26	17N	9W	PPG Oil & Gas Company, Incorporated	Thomas 1-26A	7946-8074;			M4977
Osceola	32	17N	9W	Marathon Oil Co.	BASS 1-32	3644-3680; 4876-4914; 7076-7249	21133366480000	36648	
Osceola	34	17N	9W	PPG Oil & Gas Company, Incorporated	Lutz 1-34	7517-7537; 7572-7579			M5002
Osceola	34	17N	9W	PPG Oil & Gas Company, Incorporated	Lutz 1-34A	8053-8106			M5003
Osceola	35	17N	9W	Marathon	PAINE 1-35	7591-7748; 8082-8096	21133361860000	36186	
Osceola	35	17N	9W	Marathon Oil Co. OIL CO	STATE HERSEY 2-35	7592-7767	21133363550000	36355	
Osceola	35	17N	9W	Marathon Oil Co. OIL CO	GREIN 1-35	7594-7681;	21133387480000	38748	
Osceola	36	17N	9W	McCool John E	GREIN ET AL 2-36	7529-7702	21133360330000	36033	
Osceola	36	17N	9W	Marathon Oil	BABCOCK ET AL 1-36	7549-7692	21133360680000	36068	
Osceola	36	17N	9W	Marathon Oil	THOMPSON 3-36	7634-7852; 8090-8137; 8147-8157; 8166-8176; 8185-8	21133361100000	36110	
Osceola	36	17N	9W	Marathon Oil	BALDINO 1-36	7577-7628	21133369250000	36925	
Osceola	36	17N	9W	Marathon Oil Co. OIL CO	HODGES ET AL 1-36	7605-7773	21133369910000	36991	
Osceola	23	17N	10W	Marathon Oil Co. OIL CO	KAVERMAN 1-23	7163-7422; 7533-7537;	21133355510000	35551	
Mecosta	12	14N	7W	WILLMET INC	WAGER 2-12A	7474-7711;	21107352590100	35515	
Mecosta	6	16N	8W	Marathon	JOHNSON ET AL 1-6	7621-7857; 8103-8193;	21107360670000	36067	M4994
Mecosta	7	16N	8W	WILLMET INC	STEIN 1-7	7632-7854;	21107361870000	36187	
Mecosta	18	16N	8W	P P G OIL AND GAS CO INC	STEIN 1-18	7499-7500; 7534-7647	21107368900000	36890	
Mecosta	1	16N	9W	PPG Oil & Gas Company, Incorporated	Johnson 1-1	7735-7850;			M5001
Mecosta	2	16N	9W	Marathon Oil	JENSEN 1-2	7498-7537; 7541-7611	21107371880000	37188	
Mecosta	10	16N	9W	Marathon Oil Co.	BOYD 1-10	3817-3832; 5040-5055; 5137-5163; 7254-7420;	21107364550000	36455	
Mecosta	11	16N	9W	PPG Industries Inc	WARD 1-11	7467-7577;	21107368640000	36864	
Mecosta	12	16N	9W	P P G INDUSTRIES INC	Pilarski 1-12	7600-7774; 7943-8109	21107003407000	00340	M0340
Mecosta	12	16N	9W	WILLMET INC	PARK 1-12	7497-7672;	21107362830000	36283	
Mecosta	12	16N	9W	P P G INDUSTRIES INC	Pilarski 1-12A	7960-8048			M6061
Mecosta	12	16N	9W	P P G INDUSTRIES INC	Pilarski 1-12B	8022-8109			M6062

- **Figure I1** is a map showing deep wells in the AOR with catalogued core through the confining and injection interval. Virtually every deep well in the AOR has a core associated with it.

No fissures or natural solution channels have been observed in any of the salt cores.

I.5 Determination of fracture closure pressure of the injection zone (non-hazardous wells) or injection interval (hazardous wells). For Class III wells the testing must be designed to obtain data on fluid pressure, fracture pressure, and physical and chemical characteristics of the formation fluids if the formation is naturally water bearing. Only fracture pressure is required if the program formation is not water bearing. (Does not apply to existing Class III wells or projects.)

Sal is a non-porous, non-water bearing interval; therefore the fracture pressure can be determined as follows:

A micro pump in and transient pressure leak off test with fully saturated KCl and NaCl fluid can be performed before dissolution begins on the Class III interval, when the casing and cement is in immediate and sealing contact with the formation.

A mini fracture injection test is done immediately following initial exposure to the formation following first time perforating. A fully saturated brine can then be micro pumped into the formation to induce a micro fracture and the leak-off and closure pressure observed over the course of 24 hours.

This is called a diagnostic fracture injection test (DFIT™) (a.k.a. DFIT™ Test, Pre-Stim, Injection Fall-off, Data Stim or Mini Stim) and is the dominate pressure transient test
What is the DFIT™ or Injection Fall-Off Test

The DFIT™ (Diagnostic Fracture Injection Test) is an acronym coined by Halliburton. Schlumberger calls their equivalent test a MFO (Mini Fall-off), other operators and service companies may refer to it variously as a Data Stim or Mini Stim but is defined as:

a short duration, small volume fracturing operations where a small amount (<100 BBLS) of KCL water is pumped until fracture initiation. At that point the wing or stimulation valve is closed allowing the well's pressure to fall-off naturally over the course of 24 to 48 hrs. (or longer).

This data can be utilized to gather the fracture closure pressure of the Salina A-1 salts.

I.6 Injectivity/fall-off testing of injection zone/interval, including interference testing if multiple wells are proposed.

This is not applicable to a salt horizon and not requested for Class III Wells; although upon communication between two injection wells in a single cavern, injection and production observation tests will be performed to ensure adequate communication and that the injection-withdrawal ratio is 1:1.

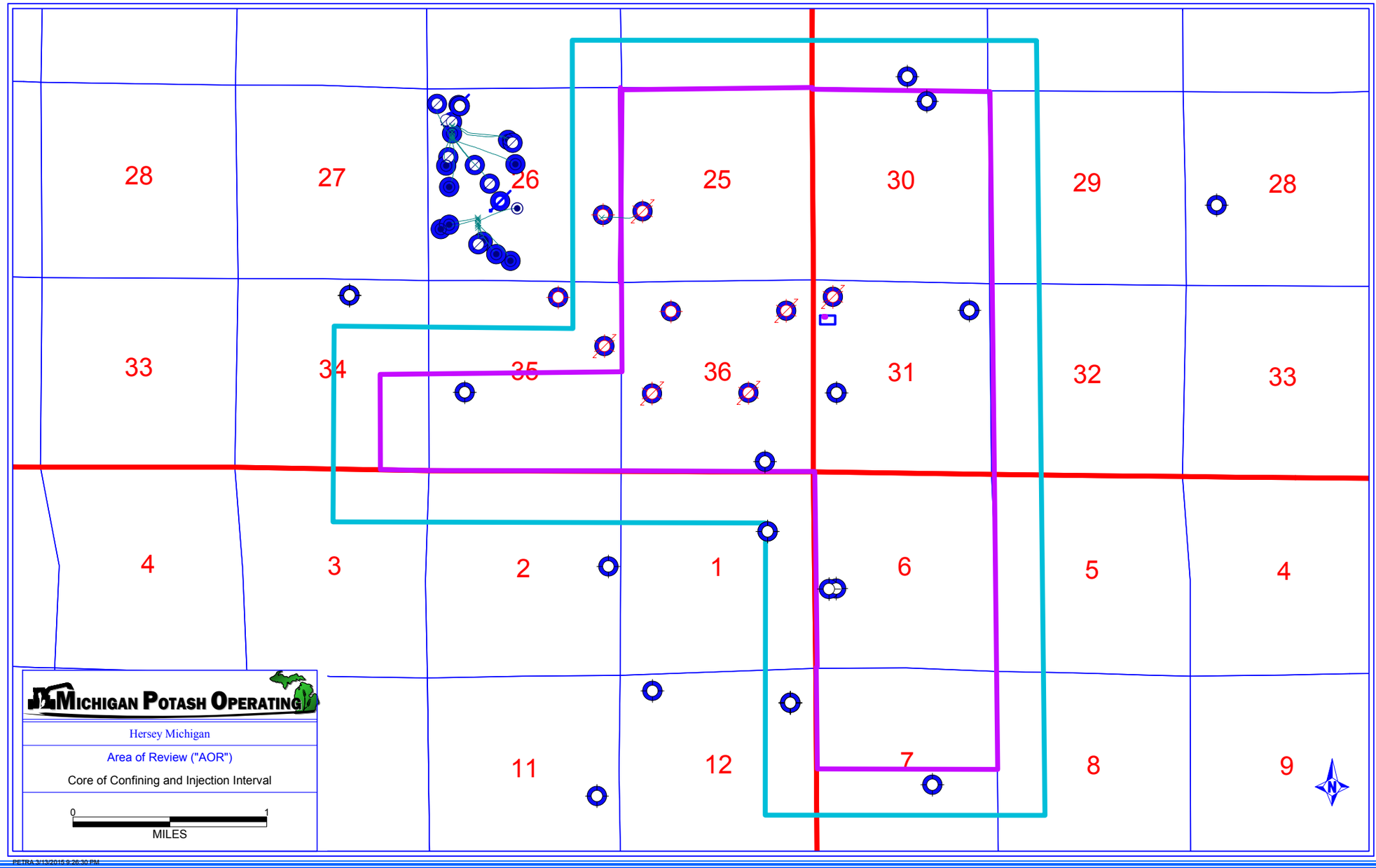


Figure I1. Showing deep wells in the AOR with catalogued core through the confining and injection interval. Virtually every deep well in the AOR has a core associated with it. Blue circles behind the well symbol indicate a cored interval in the zone of interest.

US EPA UIC PERMIT APPLICATION FORM 7520-6

Sodium and Potassium

CLASS III

ATTACHMENT J: STIMULATION PROGRAM

THE UNITED STATES POTASH PROJECT
APRIL 2015

J. STIMULATION PROCEDURE

There is no anticipated breaking of the rock. The only stimulation of the proposed injection zone will be via fresh water dissolution of sodium chloride and potassium chloride.

US EPA UIC PERMIT APPLICATION FORM 7520-6

Sodium and Potassium

CLASS III

ATTACHMENT K: INJECTION PROCEDURES

THE UNITED STATES POTASH PROJECT
APRIL 2015

ATTCHEMENT K.
INJECTION PROCEDURES

EPA instruction, form 7520-6 (2011):

INJECTION PROCEDURES - Describe the proposed injection procedures including pump, surge, tank, etc.

K.1 INJECTION PROCEDURES

A. Solutioning System

1. Single Well Operation

a) The wells will be initially operated as a single well with annulus injection and and tubing withdrawal. The well will be operated as a single well until the cavity size is large enough to connect with an adjacent cavity. It will then be operated in multi-well operation.

2. Multi-Well Operation

a) After connection has been established between two wells in an single cavern, the wells will be operted as a two well gallery. Each well may be operted as an injection or withdrawal well in the multi-well mode. The wells will be operated in the multi-well mode until the caverns fail to yeild satisfactory potassium chloride saturation and the full targeted potassium reserve recovery has been obtained.

B. Operating Parameters

1. Average injection flow will rnage from 50 gpm to 350 gpm with short-term peak flow to 500 gpm.
2. Withdrawal flow will approximate injection volume. No losses are anticipated to the formation.
3. Injection temperature will range from 50°F to 180°F.
4. Injection pressure will depend on the injection flowrate and the density difference of the injection and withdrawal fluids. It is anticipated that the injection pressure will range between 900 and 2500 psig.
5. Specific gravity of the withdrawal fluid will range between 1.0 (water) and 1.25 (brine).
6. Specific gravity of the injection fluid will range between 1.0 (water) and 1.25 (brine).
7. Chemical composition of the withdrawal fluid will depend on the ore being dissolved and is anticipated to range from nearly pure water to an aqueous solution of sodium chloride (NaC1) and postassium chloride (KC1) containing up to 360 gpl combined dissolved NaC1 and KC1.
8. There are no man made or chemical pre-treatments whatsoever.

K.2 Plant plan showing flow line of stream(s) to be injected

Figure K1 is an illustration of the proposed to build injection location. Each proposed directional drilling pad location will contain a facility such as this. The facility location will occupy no more than 2.5 acres more or less. Piezometric surfaces are shown to illustrate the proper placement of groundwater monitoring wells. The entire location is graded inward, over appropriate liners/gravel/cement for the purpose of storm water catch. Tertiary containment is included. Ground water monitoring wells are intentionally placed outside of the tertiary containment and shall be monitored and sampled according to the recommended sampling frequency as per the ground water monitoring plan as designed and implemented proactively despite being a Non-Hazardous facility. All lines will be above ground, insulated, and heat traced. There shall be no underground lines. The production manifold will be in the pump house.

Tanks are utilized for freshwater holding tanks, recycle holding tanks, surge tanks, and other volumes as deemed necessary to maintain safe and flexible operations.

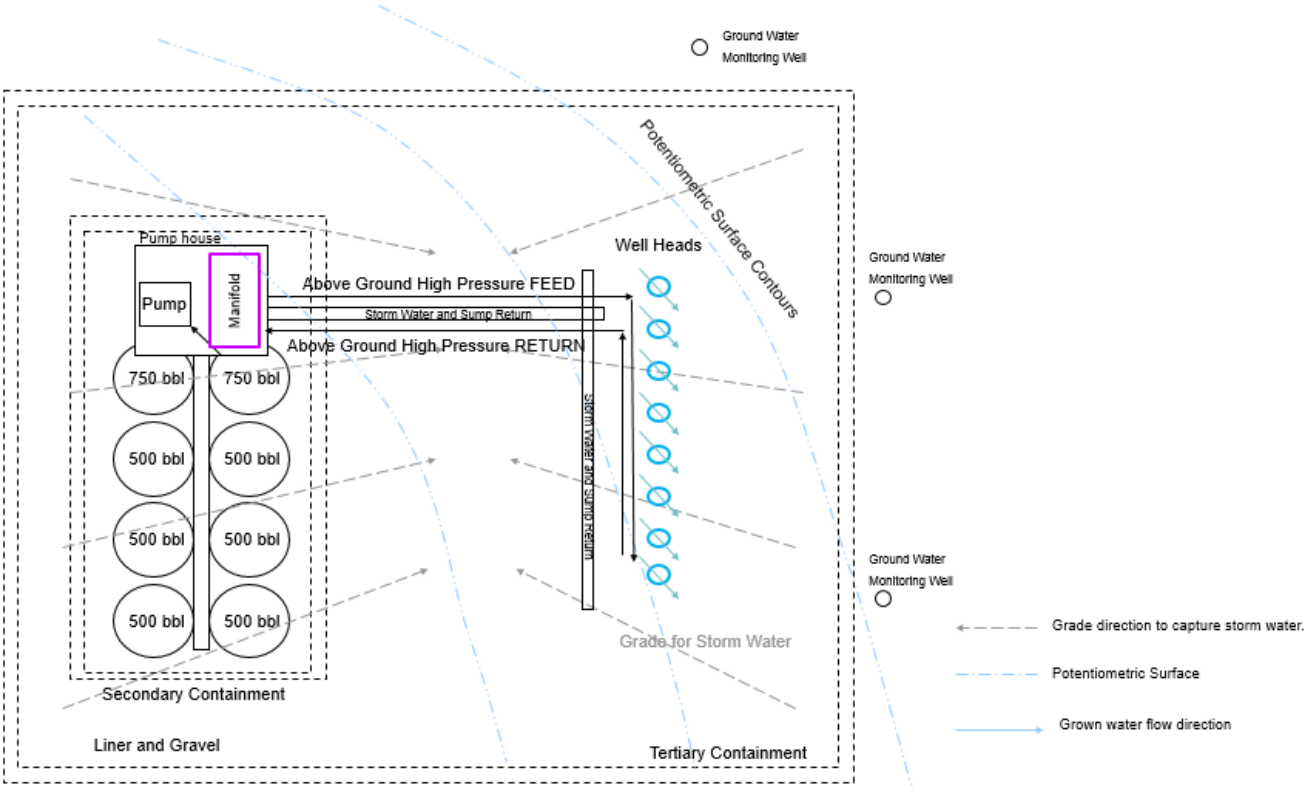


FIGURE K1. Proposed Plant Plan

K.3 Description of filters, storage tanks (including capacity), and any pretreatment processes and facilities, including location on plant plan

There will be no filter for the Class III injection system. All tanks are internally resin coated carbon steel or fiberglass, some with external insulation. The 500 bbl tanks are 24H x 12W. The 750 bbl tanks measure 24H x 15.6W. The total capacity on location is 3500 bbls or 147,000 gallons. Secondary containment is designed accordingly. Tanks are utilized for freshwater holding tanks, recycle holding tanks, surge tanks, and other volumes as deemed necessary to maintain safe and flexible operations.

K.4 Description of injection pumps, including rate capacity

A single pump can service multiple wells. It is anticipated that the Class III operation will have two centrifugal horizontal pump systems, ranging between 1370 and 1500 hp, capable of between 850 gpm at approximately 2500 psi. A pressure relief valve is used to prevent over pressure of the lines.

K.5 Description of annulus pressure maintenance system

The Class III 4 ½" x 7" annulus is equipped with a positive displacement pump to maintain the annulus pressure. Small volumes of fluid are sent down the annulus and into the 4 1/2" production string to facilitate the production string from salting off due to temperature changes. These volumes are small, approximating 2-3 gpm per well. Cumulative fluid volume and pressure are monitored real time via electronic pressure and flow rate transducers.

K.6 Description of alarm and shut-off system

Pressure transmitters are to be used on all injection wells alarm for high injection pressure and low annulus pressure. Pumps are shut down manually if high injection pressure occurs. The annulus pump is used to manually increase annulus pressure if the annulus pressure drops to below an acceptable injection rate or injection pressure. A pressure relief valve or rupture disc is used to protect surface and down hole equipment from over pressure.

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CLASS III

ATTACHMENT L: CONSTRUCTION PROCEDURES

THE UNITED STATES POTASH PROJECT
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ATTCHEMENT L.
CONSTRUCTION PROCEDURES

EPA instruction, form 7520-6 (2011):
CONSTRUCTION PROCEDURES -Discuss the construction procedures (according to §146.12 for Class I, §146.22 for Class II, and §146.32 for Class III) to be utilized. This should include details of the casing and cementing program, logging procedures, deviation checks, and the drilling, testing and coring program, and proposed annulus fluid. (Request and submission of justifying data must be made to use an alternative to packer for Class I.)

L.1 Detailed well construction procedures

Proposed Mud Program

Surface Hole (0' – 800' +/-): The surface hole drilling fluid will consist of an 8.4 - 9.0 ppg fresh water spud mud formulation with 28-36 viscosity units with fluid loss control as necessary to reach the base of the glacial till. Limit total solids to 4-6%.

Intermediate Hole (800'+/- to TD 5,500'): The intermediate hole drilling fluid will consist of a 9.0 – 9.6+ ppg water based mud system with 40-50 viscosity units and less than 25 fluid loss units. At +/- 4080, a low water loss system should be used to 5,500'.

Production Hole (5,500'+/- to TD 7,800'): The production hole drilling fluid will consist of a 9.0 – 11.7+ ppg water based mud system with 40-50 viscosity units and less than 25 fluid loss units. The fluid will be allowed to salt and brine in the Salina Group, reaching salt saturation before the A-1 Salt interval. The fluid should then be artificially saturated with KCl from the top of the A-1 Carbonate to TD.

Drill Stem Tests
There will be no drill stem checks.

Deviation Checks
For straight holes, Every 750' of drill depth a deviation survey shall be performed. More frequently if the deviation angle goes beyond the planned allowance. For deviated holes, the wells will have real time directional control and monitoring and/or magnetic single shot instruments while drilling. Verification surveys taken with gyroscopic multi-shot instruments in cased hole will be performed.

Open Hole Logs

Surface Casing: Resistivity, Spontaneous Potential, Caliper and GR.

Intermediate Casing: Resistivity, Spontaneous Potential, Neutron Density, Compensated Formation Density, Gamma Ray, Caliper, Photo-Electric Effect, Multi-pad Micro Resistivity, Borehole volume analysis.

Production Casing: Resistivity, Spontaneous Potential, Neutron Density, Compensated Formation Density, Gamma Ray, Caliper, Photo-Electric Effect, Multi-pad Micro Resistivity, Borehole volume analysis

Cased Hole Logs

Surface Casing: cement bond log, variable density log with collar locator, and temperature log

Intermediate Casing: cement bond log, variable density log with collar locator, and temperature log

Production Casing: A cement bond log, variable density log, and collar locator will be run from total depth to surface. The depth of the casing is checked using a collar locator log to locate the marker joint. Before any injection commences, a baseline temperature log will also be run, so that comparative analysis can be performed following the commencement of injection.

Detailed Drilling Procedure

The proposed injection wells will be drilled and cased according to the following detailed construction procedure:

1. Line locate. Prepare footprint.
2. Provide 24 hour notice of move in rig up to all regional, State, and Federal authorities.
3. Report expected SPUD.
4. Permit will be on location at all times.
5. Drive 16" conductor to 100'.
6. Move in Rig Up Drilling Unit.
7. Drill rat hole and mouse hole.
8. Notify all regional, State and Federal authorities with SPUD report.
9. Mix fresh water mud and with 40-50 funnel viscosity and 8.4-9.0 lb/gal weight, or as dictated.
10. Initiate surface drilling with 17 ½" rock bit. Catch samples from 0-600', every 50' and bag.
11. At 800' KB, Trip out of hole while standing back. Run open-hole logs. Pick up and run in hole with 13 3/8" 54# K-55 STC casing. +/- 7 centralizers installed midway on every second joint. Weld bottom joints. Set and Cement according to cement design. Expect +/- 20 bbl MUD FLUSH, 450 SX 50/50 Poz Premium and Lite, 1.47 Yield, designed with 20% Excess.
12. Bump plug and wait on cement.
13. Nipple up 13 3/8 casing spool. Nipple up 3000# hydraulic annular preventer, 5K Blow out preventer, pipe over blinds, and choke manifold. Test.
14. Pick up 12 1/4" Tri-Cone Rock bit, crows foot (pump through check plug), 12 x 6 ¼" drill collars, change over, drill pipe (Portions of bottom hole assembly subject to design change). Trip into plug and trip out while standing back. Run cased hole logs for surface casing.
15. Inspect and test pipe rams. Move in rig up Service Mud.
16. Trip in hole with bottom hole assembly and drill through surface shoe and test.
17. At the appropriate depth as determined by mud logging, Move in rig up testers. Trip out of hole while standing back.
18. If a directional well, trip out of the hole and pick up directional tools at kick-off depth.
19. Proceed to drill to 5,500' Intermediate Depth, which is across all near injection horizons.
20. At 5,500 Intermediate Depth, pull off bottom 1 stand and circulate. Make long short trip.
21. Condition well for Open Hole Logs.
22. Trip out of hole while laying down drill pipe and Bottom hole assembly.
23. Move in rig up wireline service. Run open hole suite. Rig down move out wireline service.
24. Move in rig up casing crew. Pick up and Run in hole with 9 5/8" guide shoe, short joint, 9 5/8"

float collar, 9 5/8" 43#-40# L-80 or equivalent API grade LTC production casing to surface. Run centralizers every other joint from 5,500 to +/- 3800' True Vertical Depth. Weld bottom 5 Joints. Run DV Tool at +/- 3500,' so as to bring cement to surface.

25. Move in rig up cement services.
26. Haul in biocide treated fresh water for cement displacement.
27. Cement the intermediate casing as per the design proposal while reciprocating. Stage 1: 20 SX Mud flush, 380 SX 50/50 Poz Premium-Class A Premium, 1.47 Yield, designed with 20% Excess. Work Casing and Open DV tool, Stage 2: 940 SX 14.2 LITE Premium, 1.47 Yield, designed with 20% Excess Stage 2 Top of cement: Surface.
32. Drop the plug and displace cement.
33. Rig down move out casing crew. Rig down move out cement services.
34. Nipple up 9 5/8" casing spool. Nipple up 3000# hydraulic annular preventer, 5K Blow out preventer, pipe over blinds, and choke manifold. Test. Wait on Cement.
35. Pick up 8 3/4" Tri-Cone Rock bit, crows foot (pump through check plug), 12 x 6 ¼" drill collars, change over, drill pipe (Portions of bottom hole assembly subject to design change).
15. Inspect and test pipe rams.
16. Trip in hole with bottom hole assembly and drill through DV tool, intermediate shoe and test.
17. If a directional well, trip out of the hole and pick up directional tools at kick-off depth.
19. Proceed to drill to 7,850' True Vertical Depth, which is through the injection horizons, and will TD in the Salina A-1 Salt.
20. At 7,850 Total Depth, pull off bottom 1 stand and circulate. Make long short trip.
21. Condition well for Open Hole Logs.
22. Trip out of hole while laying down drill pipe and Bottom hole assembly.
23. Mover in rig up wireline service. Run open hole suite. Rig down move out wireline service.
24. Move in rig up casing crew. Pick up and Run in hole with 7 " guide shoe, short joint, 7" float collar, 7" 23-28# L-80 or equivalent API grade LTC production casing to surface. Run centralizers every other joint from 7,850 to +/- 6000' True Vertical Depth. Weld bottom 5 Joints.
25. Move in rig up cement services.
26. Haul in biocide treated fresh water for cement displacement.
27. Cement the production casing as per the design proposal while reciprocating. Stage 1: 20 SX Mud flush, LEAD: 850 SX 50/50 Poz Premium-Class H, 1.47 Yield, TAIL: 150 SX High Compressive H or equivalent, 1.15 Yield. Top of Cement: Surface.
32. Drop the plug and displace cement.
31. Rig down move out casing crew. Rig down move out cement services.
32. Set casing cap.
33. Rig down move out Drilling Unit.

Completion

34. Set rig anchors. Move in rig up service unit. Spot power swivel and rig tank. Nipple up blow out preventer, pipe over blinds.
36. Mover in rig up wireline.
37. Run Cement bond long, variable density log, casing collar locator log.
38. Perforate the Salina A-1 salt at the chosen perforation depth.
39. Rig down move out wireline. Move in rig up micro injection analysis team (See Section I.5).

40. Run micro injection/parting test as follows:

    a. Install a calibrated 10,000 psi pressure gauge and recorder on the discharge line of the pump.

    b. Pump saturated sodium/potassium water into well at a slow rate and obtain a stabilized injection pressure at micro rates. Record rates, pressures, and time duration of entire test.

    c. Plot data according to industry standards for micro injection analysis (See Section I.5) and determine formation parting pressure and closure.

    d. Conduct pressure fall-off test. After injection test is completed, shut well in and record micro pressure falloff over the course of 48 hours.

41. Move in rig up service rig. Nipple up blow out preventer. Move in and spot 4 ½" 11.6# EUE production string.
42. Pick up 4.5" 10' tailpipe, Seating nipple, change over, 7" 10K Arrowset full bore packer, 10' pup joint, Seating nipple, 4.5" 11.6# tubing and Run in hole to +/- 7500' KB. Set packer in compression.
43. Test casing and packer seal to 80% of burst pressure.
44. Move in and spot 2 7/8" 6.5# L-80 tubing. PU and RIH to 7800'.
45. Nipple down blow out preventer. Nipple up 7" 5K x 4.5" wellhead.
47. Rig down move out service unit.

Please refer to Figure F16 for a well schematic of the proposed injection well.

L.2 Timetable for drilling, logging and formation testing

Anticipated timing for drilling is permit dependent.

Drill time, following spud, will approximate 15 days for drilling and casing, 2 days for intermediate pipe and waiting on cement, 1 day for open hole logging. This is a total anticipated time of eighteen days per well.

L.3 Open hole and cased hole logs

As per Section L.1, re-stated here.

Open Hole

Surface Casing: Resistivity, Spontaneous Potential, Caliper and GR.

Intermediate Casing: Resistivity, Spontaneous Potential, Neutron Density, Compensated Formation Density, Gamma Ray, Caliper, Photo-Electric Effect, Multi-pad Micro Resistivity, Borehole volume analysis.

Production Casing: Resistivity, Spontaneous Potential, Neutron Density, Compensated Formation

Density, Gamma Ray, Caliper, Photo-Electric Effect, Multi-pad Micro Resistivity, Borehole volume analysis

Cased Hole

Surface Casing: cement bond log, variable density log with collar locator, and temperature log

Intermediate Casing: cement bond log, variable density log with collar locator, and temperature log

Production Casing: A cement bond log, variable density log, and collar locator will be run from total depth to surface. The depth of the casing is checked using a collar locator log to locate the marker joint. Before any injection commences, a baseline temperature log will also be run, so that comparative analysis can be performed following the commencement of injection.
.

L.4 Mechanical integrity testing (cement bond logs, radioactive tracer log, and temperature, noise or oxygen activation log are required)

All required logs will be run at before any perforations are added to the casing and before fluid injection commences.

The mechanical integrity of all the proposed injection wells will be tested according to the requirements of 40 CFR 146.8(c)(3-4). The cement and casing design comprehensively protects all USDWs. The cement and casing design, this with pressure testing, should ensure that (1) there are no significant leaks in the casing, tubing, or packer and (2) there is no significant fluid movement into a USDW through vertical channels adjacent to the injection wellbores. As required by permit, mechanical integrity tests shall be conducted at the required frequency, and especially before any injection commences. The timing of these test shall be dictated according to pro-active best practice.

1. Mechanical integrity testing, and
2. cementing records, and
3. cement bond logs, and
4. variable density logs, will be performed/run unconditionally, and
5. temperature log will be run before injection commences, and

1-5 as otherwise directed by permit.

Gauges used in performance of the MIT will be calibrated to an accuracy of not less than 0.5 percent of fullscale prior to field use. A copy of the calibration certificate will be submitted to USEPA each time the gauge is calibrated.

Notice will be made to the USEPA and the MDEQ at least thirty days prior to the date of the schedule MIT. Tests must be witnessed by a representative of the USEPA and/or MDEQ. A written report of the results of the MIT will be made to the USEPA within 45 days following completion of the MIT.

L.5 Buffer fluid and volume, if any

Initially, the annular space between the 4 ½" x 7" casing will be filled with a quantity of under saturated brine.

L.6 CFR 40 § 146.32 Check List Items

Well construction and design is improved over prior practices, and based on real experiences from ongoing operations between 1989 and 2013. The casing and cement design are based on those successfully incorporated in Michigan at the proposed depth and via the same operational practice.

Part (A)

(1) Depth to Injection Zone: 7,650' TVD (See Figure F5 & F16)
(2) Injection Pressure: See Section H.2.
(3) Hole Size: 8 ¾" at the Injection Zone (See Figure F16 and Section L.1)
(4) Size and Grade of Casing Strings: (See Section M.1 and Figure F16)
(5) Corrosivity of Injection Fluids: The injection fluids are not corrosive and are treated with oxygen scavengers when necessary. The return fluids has the potential to contain minimal quantities of dissolved gas, and therefore, L-80 material is utilized for the 4 ½" and 2 7/8" production strings. The 7" casing is not exposed to return fluids.
(6) Lithothy of Injection Zone: See Attachment F.
(7) Type and Grade of Cement: See Attachment M.

Part (B)

A full log suite is proposed. See Section L.1 and L.3.

Part (C)

1. Fluid Pressure: Not Applicable; injection zone does not contain water or porosity.
2. Fracture Pressure Determination: See Section L.5.
3. Physical and Chemical Characteristics of formation fluids: Not Applicable, injection zone does not contain formation fluids.

Part (D)

See Section L.5.

Part (E)

Not Applicable; injection zone does not contain water or porosity.

Part (F)

Not Applicable; injection zone does not contain water or porosity.

Part (G)

The injection zone at 7,650' is away and apart from any influence on any USDW, the deepest of which in the AOR currently utilized is 200' (See FigureD2).

Part (H)

A Groundwater monitoring program is proposed, for the purpose of identifying any potential accidental release associated with any proposed centrally located pad location, and is attached for review as APPENDIX A.

In summary the following CFR 40 § 146.32(H)(1-6) are summarized here:

(1) The population relying on the USDW affected or potentially affected by the injection operation;

The proposed project area is lightly populated, consisting of mostly hunting ground. There are currently 43 water wells completed from 210' or shallower in the entire AOR covering roughly 6,000 acres, or approximately .007 wells per acre. Stated differently, there is approximately 1 registered water well for every 140 acres (+/- ¼ square mile) in the AOR (See Figure D2).

(2) The proximity of the injection operation to points of withdrawal of drinking water;

There are two registered water wells within a 1000' foot radius of the first proposed injection location as per Section zone (Babcock and Peacock). The next nearest water well is 2260' (.4 Miles) away. The next nearest water well is 3000' away (0.56 Miles).

(3) The local geology and hydrology;

See Appendix D.

(4) The operating pressures and whether a negative pressure gradient is being maintained;

Not applicable. The Class III injection process is independent from any piezometric pressure gradient or influence on any USDW.

(5) The nature and volume of the injected fluid, the formation water, and the process by-products; and

Not applicable. The Class III injection process is independent from any piezometric pressure gradient or influence on any USDW.

(6) The injection well density.

The proposed Class III Area development includes tightly controlled surface locations to minimize surface disturbance and environmental control and impact. This centralized design enables the operation to more effectively monitor and control all fluid movement and control any inadvertent releases.

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ATTACHMENT M: CONSTRUCTION DETAILS

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ATTCHEMENT M.
CONSTRUCTION DETAILS

EPA instruction, form 7520-6 (2011):
CONSTRUCTION DETAILS - Submit schematic or other appropriate drawings of the surface and subsurface construction details of the well.

The following information should be included in well schematics and/or tables. Cement volumes and casing string will be slightly greater, dependent on the directional targets over the Area permit; however, the top of cement will remain the same and the casing setting depths will remain the same via True Vertical Depths (which will not vary over the AOR).

M.1 Construction of well, including total depth, completion type, casing sizes, types, weights, and setting depths

Casing and Cement Design

Casing	Hole Size	Casing OD	Weight	Grade	Thread	Set at
Conductor	20”	20”	90#	H-40	STC	100’
Surface	17 1/2”	13 3/8”	54#	J-55	STC	800’

Cemented With = 450 SX 50/50 Poz and Lite, 1.47 Yield, designed with 20% Excess
To Estimated TOC = Surface

Casing	Hole Size	Casing OD	Weight	Grade	Thread	Set at
Intermediate	12 1/4”	9 5/8”	40#	J-55	LTC	5,500’
DV Tool		7”				3,500

Cemented With = Stage 1: 380 SX 50/50 Poz-Class A, 1.47 Yield, designed with 20% Excess
Stage 1 TOC: 3,500’
Stage 2: 940 SX 14.2 LITE, 1.47 Yield, designed with 20% Excess
Stage 2 TOC: Surface

Casing	Hole Size	Casing OD	Weight	Grade	Thread	Set at
Production	8 3/4”	7”	23#	L-80	LTC	7,850’

Cemented With = LEAD: 850 SX 50/50 Poz-Class H, 1.47 Yield, designed with 20% Excess
TAIL: 150 SX High Compressive Strength E or equivalent, 1.15 Yield designed with 20% Excess
To Estimated TOC = Surface

M.2 Cement type and amount for all casing

Please refer to Section M.1 and to Figure L.1-1.

M.3 Tubing and packer specifications, including size, type, and setting depths

Class III Type Well

Tubing Size 1	4-1/2 inch
Tubing Type 1	L-80, LT&C
Tubing Weight 1	11.6#/ft
Packer	Arrowset 10K set at 7500’

During single well solutioning as per Section K.1 (A), 2 7/8” tubing is utilized inside Tubing 1:

Tubing Size 2	2 7/8 inch
Tubing Type 2	L-80, EUE
Tubing Weight 2	6.4#

M.4 Wellhead construction details

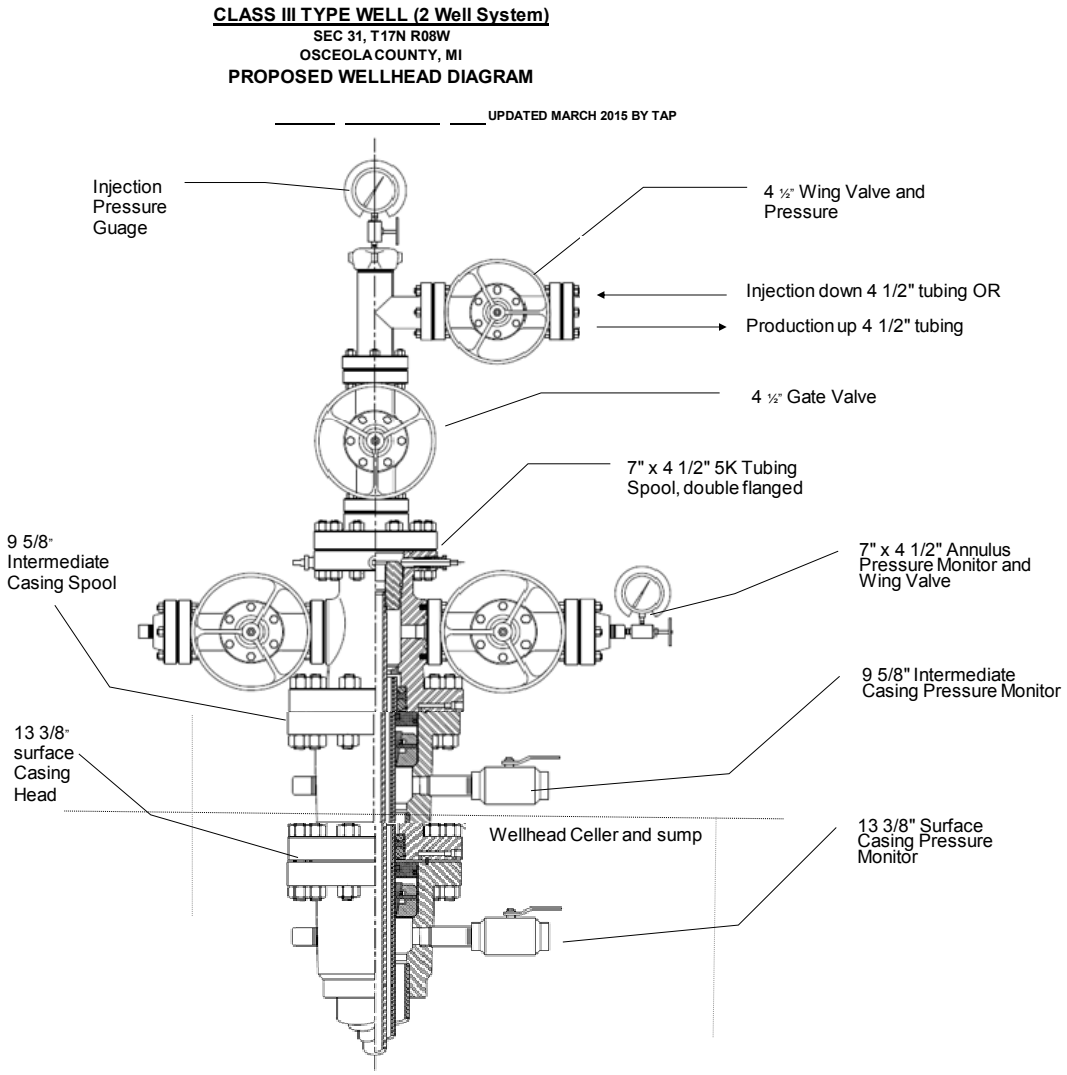

FIGURE M1. Wellhead used during multi-well operation.

- **Figure M1 (Above)** is a proposed wellhead for a typical Class III wellhead during multi-well operations as described in Section K.1 (A.2).

- **Figure M2 (Next Page)** is a proposed wellhead for a typical Class III wellhead during single-well operations as described in Section K.1 (A.1). The only difference is a tubing spacer/spool to land and pack-off 2 7/8" tubing inside the 4 ½" production tubing.

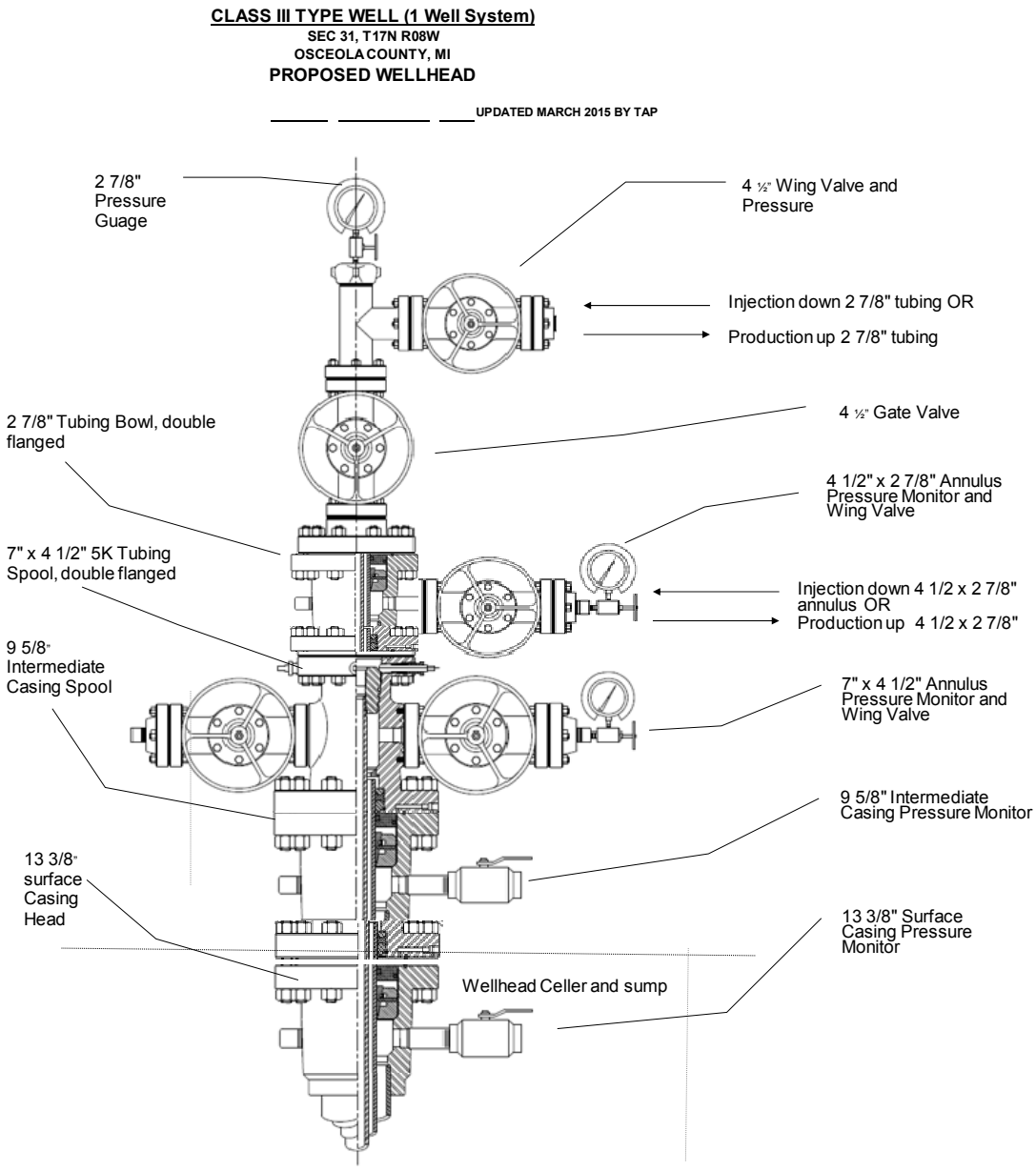

FIGURE M2. Wellhead used during single well operation

The well heads will are surrounded by a concrete and steel sump. This sump will drain through a grate by gravity as described in Section K.2 and shown in Figure K1. Leakage will be captured by a sump pump and re-injected into holding tanks and circulating fluid system.

M.5 Location of sample tap and female coupling for independent determination of annulus pressure

Please refer to Figure M1 and Figure M2. In addition, all fluids and pressure can be sampled and verified at the injection manifold as described in Section K.2 shown in Figure K1.

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ATTACHMENT N: CHANGES IN INJECTION FLUID

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EPA instruction, form 7520-6 (2011):
Discuss expected changes in pressure, native fluid displacement, and direction of movement of injection fluid (Class III wells only).

N.1 Expected Changes in Pressure

The pressure of the injection fluid will change as required to displace the withdrawal brine out of the withdrawal well. As the injection fluid saturates with salts, the density of the withdrawal fluid will increase up to 1.2 specific gravity (See Section H.2). The static head imposed by the column of the fluid in the withdrawal will change as the density of the withdrawal fluid changes as a result of the dissolving of salt in the subsurface.

The static head imposed by the column of fluid in the withdrawal well will change as the density of the withdrawal fluid changes.

The injection and withdrawal flowrate and pressures for the well(s) will be monitored by totalizing flowmeters and pressure transducers. Flow information and pressure information along with the chemical analysis and specific gravity observations of both the injection and withdrawal fluids are determined composite monitoring of flow, pressure, and density samples. This information is used to perform material balances on all fluids injected and returned. The material balance will provide accounting of the fluids injected and withdrawn and the salt taken from the well(s).

N.2 Native Fluid Displacement

There is no native fluid displacement since there is no native fluid, porosity, or permeability.

N.3 Direction of Movement of Injection Fluid

In a single well operation as described in Section K.1 (A.1), injected fluids will move down and back up the same wellbore; whereby, injected volumes will equal withdrawal volumes. The immediate return is satisfactory enough to create a brine of varying density.

In a multiple well operation as described in Section K.1 (A.2), injected fluids will move between one injector and one withdrawal well to create a brine of varying density.

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ATTACHMENT O: PLANS FOR WELL FAILURES

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ATTACHEMENT O.
CONTINGENCY PLAN FOR WELL FAILURES.

EPA instruction, form 7520-6 (2011):
Outline contingency plans (proposed plans, if any, for Class II) to cope with all shut-ins or wells failures, so as to prevent migration of fluids into any USDW. The applicant should submit contingency plans for 1) actions that will be taken if mechanical integrity of well is lost; and 2) storage or alternate treatment or disposal of waste in the case of emergency shut-in.

O.1 Contingency Plan

Item 1: Actions to be taken in the event of loss of mechanical integrity:

Brine is transmitted through the wells in tubing suspended from the wellhead and extending to a point near the top of the receiving formation. At or near the bottom of the tubing, the annulus between the tubing and the cemented casing is sealed with a packer; thus, the entire annulus from the wellhead to the packer is sealed off from the injected brine. The annulus is filled with a brine. The annulus pressure is maintained to hold a positive pressure at all times at surface and is monitored with a continuously recording pressure gauge.

If mechanical integrity was compromised the annulus fluid pressure would change and any change would be immediately detected by a change in the annulus pressure. If the injection tubing or packer developed a leak, a change in the annulus pressure would develop and would also be immediately detected by the continuously recording pressure gauge. In either case, investigative and remedial action would be promptly taken to replace or repair the part damaged following the procedures listed in Section C-1.

Item 2: Plan for alternate disposal in the case of emergency shut-in:

The Class III proposal does not include disposal fluids.

The area permit and operating practices associated with the Class III *injection and withdrawal* operation is designed in a way that injection and/or withdrawal can cease immediately, without any operational harm. Stated differently, this section is inapplicable, since there is no need for alternate disposal in the case of emergency shut in.

If failure were to occur to one well, that well can be shut-in immediately, and the entire injection flow can be ceased immediately.

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ATTACHMENT P: MONITORING PROGRAM

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ATTACHEMENT P.
MONITORING PROGRAM

EPA instruction, form 7520-6 (2011):
Discuss the planned monitoring program. This should be thorough, including maps showing the number and location of monitoring wells as appropriate and discussion of monitoring devices, sampling frequency, and parameters measured. If a manifold monitoring program is utilized, pursuant to §146.23(b)(5), describe the program and compare it to individual well monitoring.

P.1 Waste Analysis Plan

This is not applicable to a Class III application.

P.2 Description of monitoring and recording system for injection pressure, rate, volume, and for annulus pressure

- Injection flow rate, injection pressure, cumulative brine volume, and tubing-casing annulus pressure are monitored with continuous recording devices. The below described equipment is a select group of chosen equipment for electrical continuous use. In addition, pneumatic and traditional gauges and back-up electronic gauges will be installed at the pump house. Each will be recorded via a plc recording system and human interface system.

Injection pressure gauge(s)
Surface Injection Pressure Gauge: ABB Model 266HSH, V 0 -8700 PSI
Location: Installed directly into the wellhead tree cap port.
Type: Electrical; Continuous Recording
Operating Range (psig): 0 – 8700; this exceeds maximum operating range of system by more than 1000%

Casing-tubing annular pressure gauge(s)
Annular Pressure Gauge: ABB Model 266HSH, Q 0 -8700 PSI
Location: Mounted on the wellhead port open to the casing-tubing annulus.
Type: Electrical (4-20 mA); Continuous Recording
Operating Range (psig): 0 – 8700; this exceeds maximum operating range

Flow meter(s) and Temperature
Injection Flow Meter, ABB FS4000 integrated with ABB PT100
Type: Electrical; Continuous Recording

- Well operations personnel visually inspect the continuous monitoring and pneumatic recording devices and instrumentation at least once per day.

- Monitoring devices are calibrated by qualified personnel at least every 6 months. Recording devices are serviced by qualified personnel at the same time or more frequently as required.

- Pressure build-up in the injection zone caused by the operation of the well is monitored daily, monthly, and annually.

- Injection fluid characteristics are monitored according to the following schedule as follows.

Minimum sampling and reporting requirements are recommended as follows, similar to those initially written for Area Permit MI-133-3G-A0002; as follows:

	Minimum Monitoring Requirement	Minimum Reporting Requirements
Injection Pressure	Semi-Monthly	Quarterly
Cumulative injected volume:	Daily	Quarterly
Cumulative produced volume:	Daily	Quarterly
Chemical composition of the fluid	Quarterly	Quarterly
Specific Gravity	Monthly	Quarterly

While there will be manifold servicing multiple wells, pressures, rates, and volumes will be monitored on a well by well bases at the manifold and pressures will be monitored at the wellhead in duplicity. Therefore an alternate manifold monitoring program to replace individual well monitoring pursuant to §146.23(b)(5) is not proposed.

P.3 Description of sight glass level monitoring and recording, if a seal pot system of annulus pressure maintenance is utilized

A seal port system is not intended to be used on any of the proposed injection wells.

P.4 Groundwater Monitoring Plan and Quality Assurance Project Plan

This requirement is technically required only for wells injecting restricted hazardous wastes.

Michigan Potash Operating intends only to inject freshwater and non hazardous salt brine.

As a best practice, Michigan Potash Operating will be installing ground water monitoring wells surrounding the Area Permit well site(s), down gradient and has developed an a groundwater monitoring plan, APPENDIX 2.

In the AOR, groundwater generally moves in the direction of the defining topography. The static water well map, as per Figure D10 and as per Figure K1 will define the placement of groundwater monitoring wells.

Data (chlorides) will be monitored and reported to the USEPA on a quarterly basis. Chloride levels in disposal brine and process streams are typically one thousand times greater than background levels. Sampling for chlorides in the monitor well network will provide clear indication of a process system upset should such occur,

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ATTACHMENT Q: PLUGGING AND ABANDONEMENT

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ATTACHEMENT Q.
PLUGGING AND ABANDONMENT PLAN

EPA instruction, form 7520-6 (2011):
PLUGGING AND ABANDONMENT PLAN -Submit a plan for plugging and abandonment of the well including: (1) describe the type, number, and placement (including the elevation of the top and bottom) of plugs to be used; (2) describe the type, grade, and quantity of cement to be used; and (3) describe the method to be used to place plugs, including the method used to place the well in a state of static equilibrium prior to placement of the plugs. Also for a Class III well that underlies or is in an exempted aquifer, demonstrate adequate protection of USDWs. Submit this information on EPA Form 7520-14, Plugging and Abandonment Plan.

Q.1 Signed plugging and abandonment form showing amount and type of cement, placement method, and estimated cost (Region V requires a cement plug to extend from the base of the lowermost casing to the surface)

The only difference in the plug and abandonment procedures for a vertical type and directional type wellbore will be the cement volumes.

The targeted true vertical depth of the cement retainer, dictated form stratigraphic control, will be the same.

The cement volumes for the directional wellbores will be greater than those of the vertical wellbore, therefore, the third party estimate, as signed is specifically for the directional type wellbore (Section Q.2).

(1) Following is a visual wellbore diagram of the proposed wellbore schematic, matching that of Figure F16; of a type Class III vertical wellbore (VERTICAL TYPE); and

(2) a visual wellbore diagram of the plugged and abandoned vertical type wellbore (VERTICAL TYPE); and

(3) the analogous USEPA wellbore schematic of before and after (VERTICAL TYPE); and

(4) the USEPA Plugging and Abandonment estimate worksheets, including the General information form and the detailed cost estimate worksheet (VERTICAL TYPE); and

(5) a visual wellbore diagram of the type Class III directional wellbore, matching that of Figure F18 (DIRECTIONAL TYPE); and

(6) a visual wellbore diagram of the plugged and abandoned directional type wellbore (DIRECTIONAL TYPE); and

(7) he analogous USEPA wellbore schematic of before and after (DIRECTIONAL TYPE); and

(8) the USEPA Plugging and Abandonment estimate worksheets, including the General information form and the detailed cost estimate worksheet (DIRECTIONAL TYPE); and

(9) Form 7520-14 as signed.

CLASS III TYPE WELL

VERTICAL WELL

OSCEOLA & MECOSTA COUNTY, MI

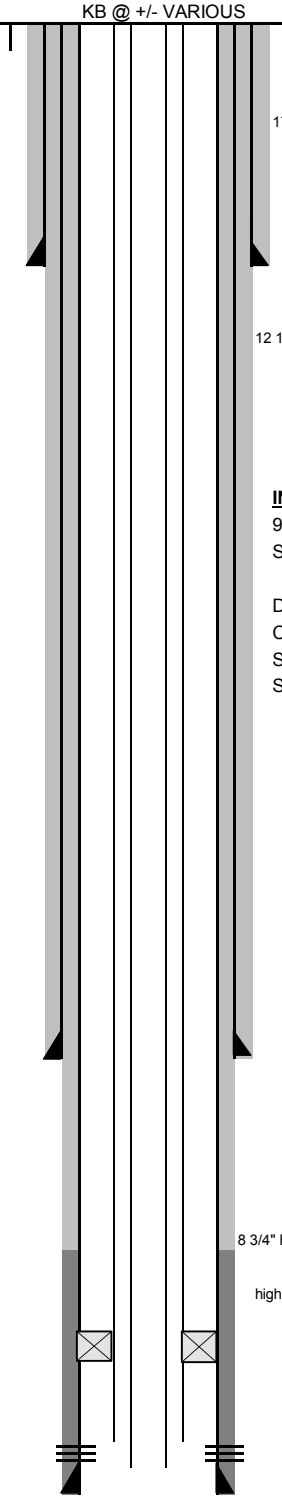
Surface: Various

PROPOSED WELLBORE DIAGRAM

GL @ +/-VARIOUS

KB @ +/- VARIOUS

Geological Zone	TVD	MD
Quaternary H	0	0
Quaternary G	0	0
Quaternary F1	59	59
Quaternary F	138	138
Quaternary E	323	323
Quaternary E/1	393	393
Quaternary D	439	439
Jurrasic Red Beds	515	515
Pennsylvantian		
Michigan	1205	1205
Marshall Sandstone	1650	1650
Coldwater Shale	1815	1815
Antrim Shale	2565	2565
Traverse Formation	3230	3230
Bell Shale	3800	3800
Dundee/Reed City	3860	3860
Detroit River Group	4090	4090
Amherstburg	4960	4960
Sylvania Sand Stone	5105	5105
Bois Blanc	5300	5300
Bass Islands Group Bass Island Evaporate	5355	5355
Salina Group	5725	5725
Salina A-2 Carbonate	7010	7010
A-2 Evaporate		
Salina A-1 Carbonate	7530	7530
A-1 Evaporate Roof	7590	7590
Class III Injection Interval	**7650**	**7650**
A-1 Evaporate Sump/Floor	7750	7750
Niagran	7940	7940



UPDATED MAR 2015 BY TAP

CONDUCTOR
20" SET @ 100'

17 1/2" HOLE

SURFACE CASING
13-3/8" 54.5# J-55
SET @ 800'
Cement to Surface
450 SX 50/50 Poz and Lite, 1.47 Yield

4250

12 1/4" HOLE DRILLED TO 5,500' (5,500 TVD)

INTERMEDIATE CASING
9 5/8# 40#-43# J-55
SET @ 5,500' MVD, TVD
At the Bass Island Evaporate Top (Below Dolomite)
DV Tool @ 3500'
Cement from Shoe to Surface
Stage 1: 380 SX 50/50 Poz-Class A, 1.47 Yield
Stage 2: 940 SX 14.2 LITE, 1.47 Yield

PRODUCTION CASING
7" 23# L-80
SET @ 7,850' MVD, TVD
In the Salina A-1 Evaporate
Cement from Shoe to Surface
LEAD: 850 SX 50/50 Poz-Class H, 1.47 Yield
TAIL (placed at bottom: 150 SX Class E HP), 1.15 Yield
or equivalent high compressive strength
20% Excess Design

PRODUCTION STRING(S)
4.5" 11.6# L-80 to Packer
Arrow set 10K differential Production Packer
SET @ 7500'.
4.5" 11.6# L-80 Tailpipe to 7750'
2 7/8" 6.5# L-80 EUE tubing to 7760'

8 3/4" HOLE DRILLED TO 7,850' (7,850 TVD)

high compressive strength cement TD to 7000'.

Select Perforations at Class III Injeciton Interval

PBTD = TD
TD @ +/- 7,850'

CLASS III TYPE WELL

VERTICAL WELL

OSCEOLA AND MECOSTA COUNTY, MI

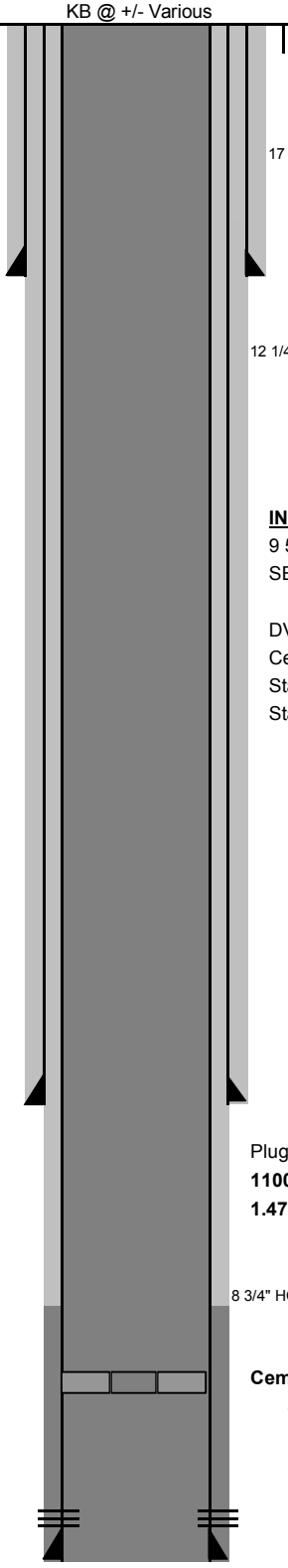
Surface: Various

PLUGGED WELLBORE DIAGRAM

GL @ +/-Various

KB @ +/- Various

Geological Zone	TVD	MD
Quaternary H	0	0
Quaternary G	0	0
Quaternary F1	59	59
Quaternary F	138	138
Quaternary E	323	323
Quaternary E/1	393	393
Quaternary D	439	439
Jurrasic Red Beds	515	515
Pennsylvantian		
Michigan	1205	1205
Marshall Sandstone	1650	1650
Coldwater Shale	1815	1815
Antrim Shale	2565	2565
Traverse Formation	3230	3230
Bell Shale	3800	3800
Dundee/Reed City	3860	3860
Detroit River Group	4090	4090
Amherstburg	4960	4960
Sylvania Sand Stone	5105	5105
Bois Blanc	5300	5300
Bass Islands Group Bass Island Evaporate	5355	5355
Salina Group	5725	5725
Salina A-2 Carbonate	7010	7010
A-2 Evaporate		
Salina A-1 Carbonate	7530	7530
A-1 Evaporate Roof	7590	7590
Class III Injection Interval	**7650**	**7650**
A-1 Evaporate Sump/Floor	7750	7750
Niagran	7940	7940



UPDATED MAR 2015 BY TAP

CONDUCTOR
20" SET @ 100'

17 1/2" HOLE

SURFACE CASING
13-3/8" 54.5# J-55
SET @ 800'
Cement to Surface
320 SX 50/50 Poz and Lite, 1.47 Yield

12 1/4" HOLE DRILLED TO 5,500' (5,500 TVD)

INTERMEDIATE CASING
9 5/8# 40#-43# J-55
SET @ 5,500' MVD, TVD
At the Bass Island Evaporate Top (Below Dolomite)
DV Tool @ 3500'
Cement from Shoe to Surface
Stage 1: 240 SX 50/50 Poz-Class A, 1.24 Yield
Stage 2: 430 SX 14.2 LITE, 1.47 Yield

PRODUCTION CASING
7" 23# L-80
SET @ 7,850' MVD, TVD
In the Salina A-1 Evaporate
Cement from Shoe to Surface
LEAD: 850 SX 50/50 Poz-Class H, 1.36 Yield
TAIL (placed at bottom: 150 SX Class E HP)
or equivalent high compressive strength
20% Excess Design

Plug Cement from Retainer to Surface
1100 SX Class A, Neat from Cmt Retiainer to Surface
1.47 Yield

8 3/4" HOLE DRILLED TO 7,850' (7,850 TVD)

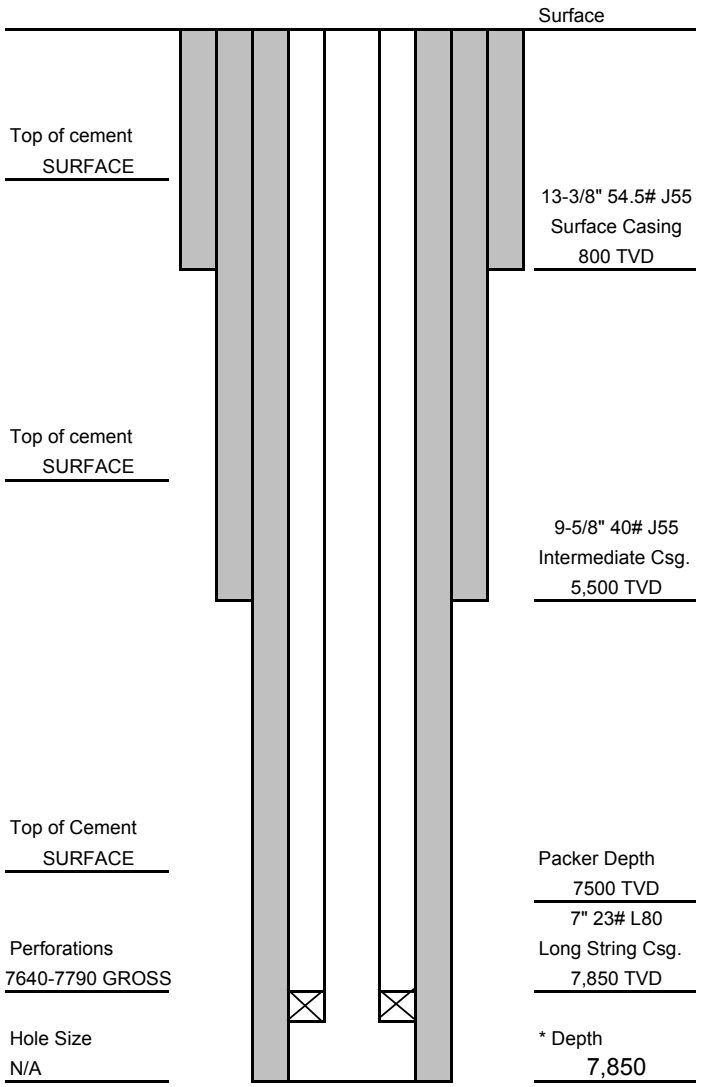
Cement Retainer @ 7,300
Squeeze 100 SX Class A, Neat below Cmt Retainer
1.47 Yield

Select Perforations at Class III Injeciton Interval

PBTD = TD
TD @ +/- 7,850'

ORIGINAL WELL CONSTRUCTION DURING OPERATION

MICHIGAN POTASH INJECTION WELL
OSCEOLA AND MECOSTA COUNTY, MICHIGAN

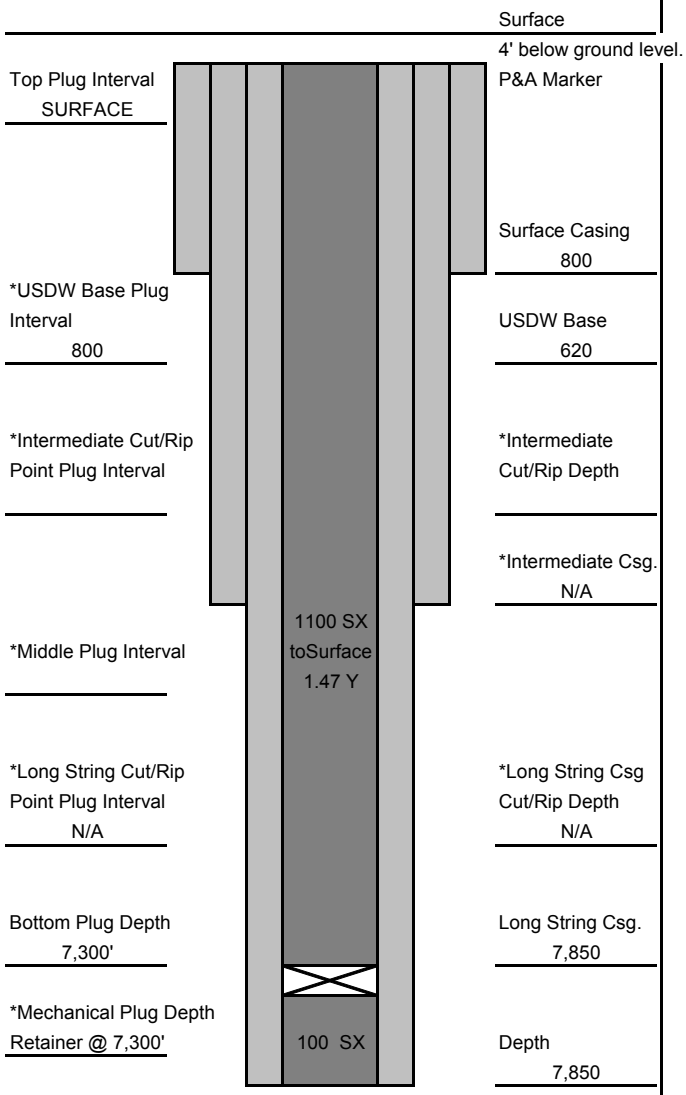


** Add Any Additional Information

* May not Apply

PLUGGING AND ABANDONMENT CONSTRUCTION

MICHIGAN POTASH INJECTION WELL
OSCEOLA AND MECOSTA COUNTY, MICHIGAN



** Add Any Additional Information

* May not Apply

LIST OF ALL OPEN AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED

Specify Open Hole/ Perforations/ Varied Casing	From	To	Formation Name
Perfoated Interval	7640	7790	Salina A-1 Evaporate/Salt

Well Location: OSCEOLA COUNTY, MICHIGAN
Well Class: Class III VERTICAL
Type of Well: Type "G"
List USDWs: Glacial Till

Formation Name	Top	Bottom
Quaternary Glacial Till	0	550

Is well construction information current? Y/N

Current Well Construction Information
(Attach a well bore diagram):

Well Construction Information	Hole Size	Casing Size (OD)	Casing grade, weight	Depth Set	Sacks of Cement
Surface	17.5"	13-3/8	54.5# J-55	800	450
Long String (Production)	8-3/4"	7"	23# L-80	7850	1000
Liner					
Tubing					
Other (additional casing string)	12 1/4"	9 5/8"	40# J-55	5500	1320

List all perforation(s) past and present:

Perforations	Depth to Top of Perf	Dept to Bottom of Perf	Active or Plugged	Formation
Class III Gross Injection Zone 1	7640	7790	proposed	Salina A-1 Salt
2				
3				
4				
5				
6				

If the perforation has been plugged, list the date and describe the procedure, including cement used, cement tops, etc.:

Total Well Depth: 7,850'

Permittee:	Michigan Potash Operating, LLC
Well Name:	TYPE CLASS III WELL (VERTICAL)
EPA Permit Number:	TBD
Party Providing Cost Estimate:	Magna Energy Services
Total Cost Estimate:	$40,500
Date of Cost Estimate:	3/25/2015

Plug Locations Required for Proper P&A:

Plug Identifier*	**Plug Top**	**Plug Bottom**	**Zone Being Protected** (such as USDW, gas, rip point etc.)
7"casing shoe @ 7850', set Cement Retainer at 7300'. Pump Class 100 SX A, 13.5 PPG, 1.47 Yield.	7300	7850	Below Retainer
Spot Class A, 13.5 PPG, 1.47 Yield, from Retainer to Surface. 1100 SX.	Surface	7300	All Intervals, and USDW.

Have any intervals/sections of the wellbore been plugged previously? If so, give the location of the plugs, the circumstances that required the plug and how the plug was set.

Plugging and Abandonment Normal Costs

1. Rig Costs

Travel (Mount Pleasant to Hersey)			miles @		per mile =	
Labor (Super & Crew)			hrs @		per hour =	
Equipment Costs (Rig cost, drilling package, etc.)		250	hrs @	24	per hour =	$6,000
Miscellaneous Site Costs (Tubing work string rental, water storage, flow tanks, mud pit, etc.)		250	hrs @	24	per hour =	$6,000
Well Head Cutting					=	$ 500.00
Cement Tagging			feet @		per foot =	
Pulling Casing/Tubing			hrs @		per hour =	

2. Cement Costs

Pump Truck & Operator (Including Set Up)		500	hrs @	1	per hour =	$500
Tank Truck & Operator			hrs @		per hour =	
Type Cement	Class A Lite	1200	sacks @	11.5	per sack =	$13,800
Type Cement			sacks @		per sack =	
Type Cement			sacks @		per sack =	
Cement Retainer(s)		1	retainer(s) @	2500	each =	$2,500
List Retainers	Above Open Hole					
Cement Additives (high temperature/pressure)					=	
Balance Plug inc. fluids and testing			plugs @		per plug =	
List Plugs:						
Surface Plug inc. fluids and testing					=	

3. Wireline Service

Transportation		hrs @		per hour =	
Labor		hrs @		per hour =	
Service Charges				=	
Perf/Squeeze		shots @		per shot =	
Cut/pull Casing		rips @		per rip =	
Cement Retainer(s)		retainer(s) @		each =	
List Retainers					
TOC Log				=	
Depth charge for gage rings, junk basket		feet @		per foot =	
Specialized tools for fluid sampling				=	

Permittee:	Michigan Potash Operating, LLC
Well Name:	TYPE CLASS III WELL (VERTICAL)
EPA Permit Number:	TBD
Party Providing Cost Estimate:	Magna Energy Services
Total Cost Estimate:	$40,500
Date of Cost Estimate:	3/25/2015

Plug Locations Required for Proper P&A:

4. Site Preparations & Costs

General Site Engineering & Plan Development				=	
Owner/Operator Site Supervisor				=	
Backhoe & Operator	10	hrs @	50	per hour =	$500
Dozer & Operator		hrs @		per hour =	
Road Construction and Improvement Costs				=	
Pit Liner				=	

5. Transportation & Miscellaneous

Special Land Use Costs (Zoning & Permits)				=	
Winch truck w/driver (wages & mileage)		hrs @		per hour =	
Water truck w/ driver (wages & mileage)		hrs @		per hour =	
Vacuum Truck w/ driver (wages & mileage)		hrs @		per hour =	
2 axle rig-up truck driver& crew wages & mileage)		hrs @		per hour =	
1 axle truck w/ driver (wages & mileage)	1	hrs @	2000	per hour =	$2,000
Hot oiler (equip, labor & mileage)		hrs @		per hour =	
Welder (equip, labor & mileage)		hrs @		per hour =	
Packer Fluid per specs		bbl @		per bbl =	
Hydraulic Jacks		hrs @		per hour =	
Bridge Plug				=	
Waste Disposal Costs				=	
Tool Rental (Describe; examples: Casing Ripper, Collar Buster, etc.)					
Tool 1				=	
Tool 2				=	
Tool 3				=	

6. Remediation Costs (mostly applicable to shallow wells)

Sample Analysis (fluid or soil)	=	
Soil Removal	=	
Site Assessment Study Costs	=	
System Removal Costs (Trucking & Siite Supervision)	=	$2,000
Disposal System Modification Costs (Cement Set Up)	=	$2,500
Installation of Monitoring Well Costs	=	
# Wells:		
Type:		
Depth:		
Construction:		

SUBTOTAL:			=	$36,300
Contingency:	10.0	%	=	$3,630
INITIAL TOTAL			=	$39,930
Inflation factor			=	1.02
TOTAL AMOUNT, Rounded to $100			**=**	**$40,500**

CLASS III TYPE WELL

DIRECTIONAL S-CURVE WELL

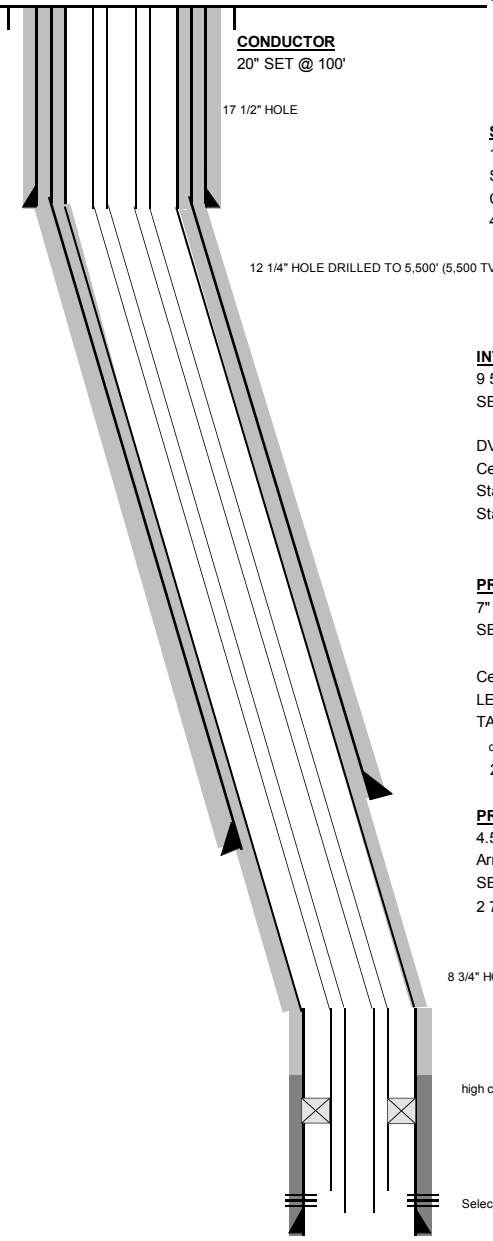
OSCEOLA & MECOSTA COUNTY, MI

Surface: Various, Bottom: Various

PROPOSED WELLBORE DIAGRAM

UPDATED MAR 2015 BY TAP

Geological Zone	TVD	MD
Quaternary H	0	0
Quaternary G	0	0
Quaternary F1	59	59
Quaternary F	138	138
Quaternary E	323	323
Quaternary E/1	393	393
Quaternary D	439	439
Jurrasic Red Beds	515	515
Pennsylvantian		
Michigan	1205	1350
Marshall Sandstone	1650	1720
Coldwater Shale	1815	1890
Antrim Shale	2565	2650
Traverse Formation	3230	3515
Bell Shale	3800	4150
Dundee/Reed City	3860	4215
Detroit River Group	4090	4560
Amherstburg	4960	5445
Sylvania Sand Stone	5105	5605
Bois Blanc	5300	5820
Bass Islands Group	5355	5885
Bass Island Evaporate		
Salina Group	5725	6300
Salina A-2 Carbonate	7010	7730
A-2 Evaporate		
Salina A-1 Carbonate	7530	8280
A-1 Evaporate Roof	7590	8340
Class III Injection Interval	**7650**	**8400**
A-1 Evaporate Sump/Floor	7750	8500
Niagran	7940	8700



CONDUCTOR
20" SET @ 100'

SURFACE CASING
13-3/8" 54.5# J-55
SET @ 800'
Cement to Surface
450 SX 50/50 Poz and Lite, 1.47 Yield

INTERMEDIATE CASING
9 5/8# 40#-43# J-55
SET @ 6,050' MVD, 5,500 TVD
At the Bass Island Evaporate Top (Below Dolomite)
DV Tool @ 4000' MD
Cement from Shoe to Surface
Stage 1: 520 SX 50/50 Poz-Class A, 1.47 Yield
Stage 2: 1000 SX 14.2 LITE, 1.47 Yield

PRODUCTION CASING
7" 23# L-80
SET @ 8,600' MVD, 7,750' TVD
In the Salina A-1 Evaporate
Cement from Shoe to Surface
LEAD: 920 SX 50/50 Poz-Class H, 1.47 Yield
TAIL (placed at bottom: 150 SX Class E HP), 1.15 Yield
or equivalent high compressive strength
20% Excess Design

PRODUCTION STRING(S)
4.5" 11.6# L-80 to Packer
Arrow set 10K differential Production Packer
SET @ 8,250' MD, 7,500 TVD,
2 7/8" 6.5# L-80 EUE tubing to 8,450 MD 7750' TVD

PBTD = TD
TVD @ +/- 7,850'
MD @ 8,600'

CLASS III TYPE WELL

DIRECTIONAL S-CURVE WELL

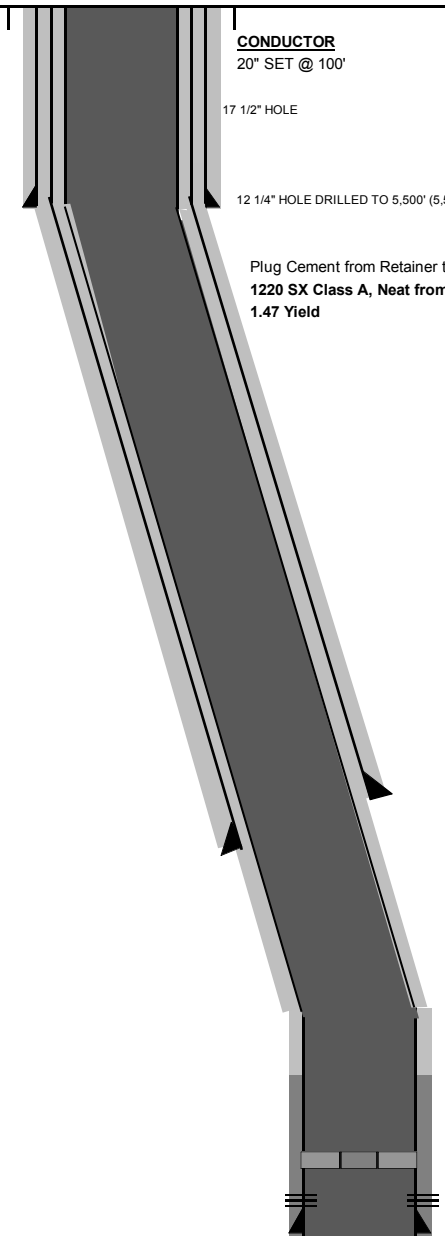
OSCEOLA & MECOSTA COUNTY, MI

Surface: Various, Bottom: Various

PLUGGED WELLBORE DIAGRAM DIRECTIONAL

UPDATED MAR 2015 BY TAP

Geological Zone	TVD	MD
Quaternary H	0	0
Quaternary G	0	0
Quaternary F1	59	59
Quaternary F	138	138
Quaternary E	323	323
Quaternary E/1	393	393
Quaternary D	439	439
Jurrasic Red Beds	515	515
Pennsylvantian		
Michigan	1205	1350
Marshall Sandstone	1650	1720
Coldwater Shale	1815	1890
Antrim Shale	2565	2650
Traverse Formation	3230	3515
Bell Shale	3800	4150
Dundee/Reed City	3860	4215
Detroit River Group	4090	4560
Amherstburg	4960	5445
Sylvania Sand Stone	5105	5605
Bois Blanc	5300	5820
Bass Islands Group	5355	5885
Bass Island Evaporate		
Salina Group	5725	6300
Salina A-2 Carbonate	7010	7730
A-2 Evaporate		
Salina A-1 Carbonate	7530	8280
A-1 Evaporate Roof	7590	8340
Class III Injection Interval	**7650**	**8400**
A-1 Evaporate Sump/Floor	7750	8500
Niagran	7940	8700



CONDUCTOR
20" SET @ 100'

SURFACE CASING
13-3/8" 54.5# J-55
SET @ 800'
Cement to Surface
450 SX 50/50 Poz and Lite, 1.47 Yield

Plug Cement from Retainer to Surface
1220 SX Class A, Neat from Cmt Retiainer to Surface
1.47 Yield

INTERMEDIATE CASING
9 5/8# 40#-43# J-55
SET @ 6,050' MVD, 5,500 TVD
At the Bass Island Evaporate Top (Below Dolomite)
DV Tool @ 4000' MD
Cement from Shoe to Surface
Stage 1: 520 SX 50/50 Poz-Class A, 1.47 Yield
Stage 2: 1000 SX 14.2 LITE, 1.47 Yield

PRODUCTION CASING
7" 23# L-80
SET @ 8,500' MVD, 7,750' TVD
In the Salina A-1 Evaporate
Cement from Shoe to Surface
LEAD: 920 SX 50/50 Poz-Class H, 1.47 Yield
TAIL (placed at bottom: 150 SX Class E HP), 1.15 Yield
or equivalent high compressive strength
20% Excess Design

PRODUCTION STRING(S)
4.5" 11.6# L-80 to Packer
Arrow set 10K differential Production Packer
SET @ 8,250' MD, 7,500 TVD,
2 7/8" 6.5# L-80 EUE tubing to 8,450 MD 7750' TVD

Cement Retainer @ 7,300 TVD, 8,050 MD
Squeeze 100 SX Class A, Neat below Cmt Retainer
1.47 Yield

PBTD = TD
TVD @ +/- 7,850'
MD @ 8,600'

FIGURE F18.

Well Location: OSCEOLA COUNTY, MICHIGAN
Well Class: Class III **DIRECTIONAL**
Type of Well: Type "G"
List USDWs: Glacial Till

Formation Name	Top	Bottom
Quaternary Glacial Till	0	550

Is well construction information current? Y/N

Current Well Construction Information
(Attach a well bore diagram):

Well Construction Information	Hole Size	Casing Size (OD)	Casing grade, weight	Depth Set	Sacks of Cement
Surface	17.5"	13-3/8	54.5# J-55	800	450
Long String (Production)	8-3/4"	7"	23# L-80	7850 TVD, 8600 MD	1070
Liner					
Tubing					
Other (additional casing string)	12 1/4"	9 5/8"	40# J-55	5500 TVD, 6050 MD	1520

List all perforation(s) past and present:

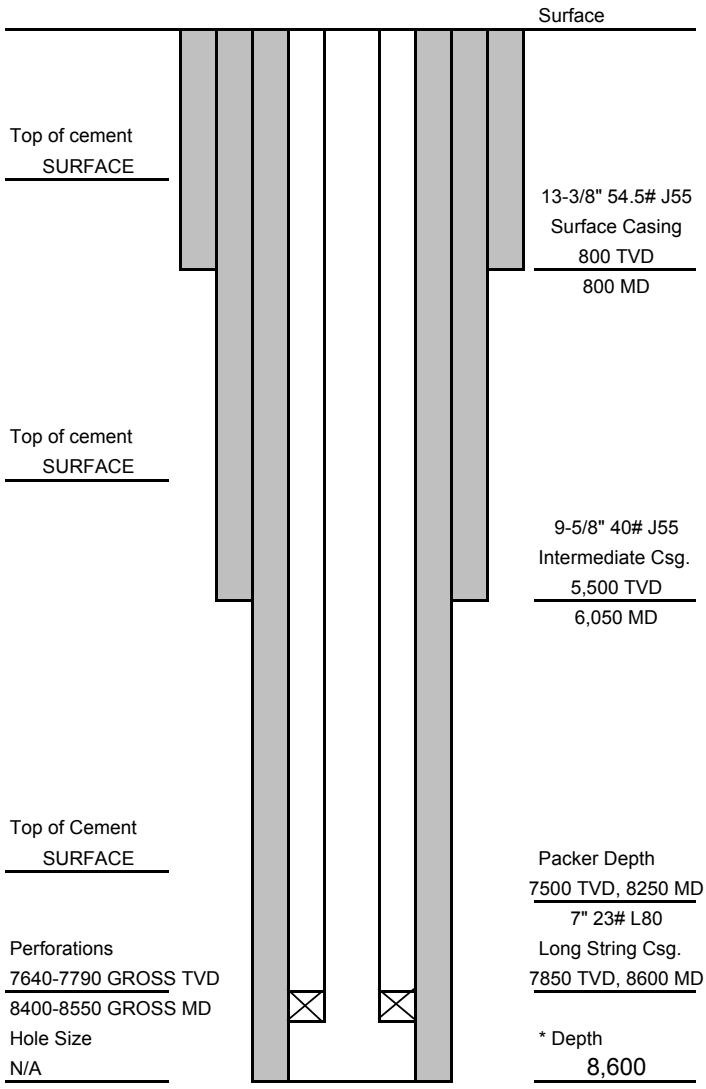
Perforations	Depth to Top of Perf	Dept to Bottom of Perf	Active or Plugged	Formation
Class III Gross Injection Zone 1	7640 TVD, 8400 MD	7790 TVD, 8550 MD	proposed	Salina A-1 Salt
2				
3				
4				
5				
6				

If the perforation has been plugged, list the date and describe the procedure, including cement used, cement tops, etc.:

Total Well Depth:____7,850' TVD, 8,600' MD_____

ORIGINAL WELL CONSTRUCTION DURING OPERATION

MICHIGAN POTASH INJECTION WELL
OSCEOLA AND MECOSTA COUNTY, MICHIGAN

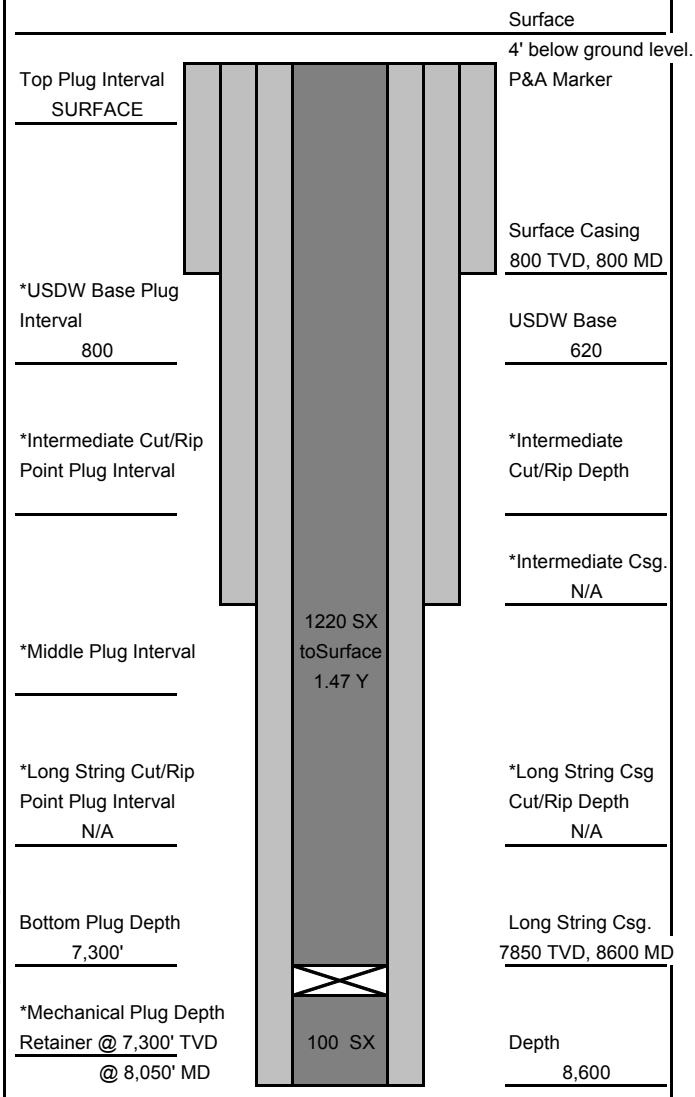


** Add Any Additional Information

* May not Apply

PLUGGING AND ABANDONMENT CONSTRUCTION

MICHIGAN POTASH INJECTION WELL
OSCEOLA AND MECOSTA COUNTY, MICHIGAN



** Add Any Additional Information

* May not Apply

LIST OF ALL OPEN AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED

Specify Open Hole/ Perforations/ Varied Casing	From	To	Formation Name
Perfoated Interval	7640 TVD	7790 TVD	Salina A-1 Evaporate/Salt
	8400 MD	8550 MD	

Permittee:	Michigan Potash Operating, LLC
Well Name:	TYPE CLASS III WELL (VERTICAL)
EPA Permit Number:	TBD
Party Providing Cost Estimate:	Magna Energy Services
Total Cost Estimate:	$50,000
Date of Cost Estimate:	3/25/2015

Plug Locations Required for Proper P&A:

Plug Identifier*	**Plug Top**	**Plug Bottom**	**Zone Being Protected** (such as USDW, gas, rip point etc.)
7"casing shoe @ 8600', set Cement Retainer at 8050'. Pump Class 100 SX A, 13.5 PPG, 1.47 Yield.	8050	8600	Below Retainer
Spot Class A, 13.5 PPG, 1.47 Yield, from Retainer to Surface. 1300 SX.	Surface	8050	All Intervals, and USDW.

Have any intervals/sections of the wellbore been plugged previously? If so, give the location of the plugs, the circumstances that required the plug and how the plug was set.

Plugging and Abandonment Normal Costs

1. Rig Costs

Travel (Mount Pleasant to Hersey)			miles @		per mile =	
Labor (Super & Crew)			hrs @		per hour =	
Equipment Costs (Rig cost, drilling package, etc.)		250	hrs @	36	per hour =	$9,000
Miscellaneous Site Costs (Tubing work string rental, water storage, flow tanks, mud pit, etc.)		250	hrs @	36	per hour =	$9,000
Well Head Cutting					=	$ 500.00
Cement Tagging			feet @		per foot =	
Pulling Casing/Tubing			hrs @		per hour =	

2. Cement Costs

Pump Truck & Operator (Including Set Up)		500	hrs @	1	per hour =	$500
Tank Truck & Operator			hrs @		per hour =	
Type Cement	Class A Lite	1400	sacks @	11.5	per sack =	$16,100
Type Cement			sacks @		per sack =	
Type Cement			sacks @		per sack =	
Cement Retainer(s), extra depth charge		1	retainer(s) @	2700	each =	$2,700
List Retainers	Above Open Hole					
Cement Additives (high temperature/pressure)					=	
Balance Plug inc. fluids and testing			plugs @		per plug =	
List Plugs:						
Surface Plug inc. fluids and testing					=	

3. Wireline Service

Transportation		hrs @		per hour =	
Labor		hrs @		per hour =	
Service Charges				=	
Perf/Squeeze		shots @		per shot =	
Cut/pull Casing		rips @		per rip =	
Cement Retainer(s)		retainer(s) @		each =	
List Retainers					
TOC Log				=	
Depth charge for gage rings, junk basket		feet @		per foot =	
Specialized tools for fluid sampling				=	

Permittee:	Michigan Potash Operating, LLC
Well Name:	TYPE CLASS III WELL (VERTICAL)
EPA Permit Number:	TBD
Party Providing Cost Estimate:	Magna Energy Services
Total Cost Estimate:	$50,000
Date of Cost Estimate:	3/25/2015

Plug Locations Required for Proper P&A:

4. Site Preparations & Costs

General Site Engineering & Plan Development				=	
Owner/Operator Site Supervisor				=	
Backhoe & Operator	10	hrs @	50	per hour =	$500
Dozer & Operator		hrs @		per hour =	
Road Construction and Improvement Costs				=	
Pit Liner				=	

5. Transportation & Miscellaneous

Special Land Use Costs (Zoning & Permits)				=	
Winch truck w/driver (wages & mileage)		hrs @		per hour =	
Water truck w/ driver (wages & mileage)		hrs @		per hour =	
Vacuum Truck w/ driver (wages & mileage)		hrs @		per hour =	
2 axle rig-up truck driver& crew wages & mileage)		hrs @		per hour =	
1 axle truck w/ driver (wages & mileage)	1	hrs @	2000	per hour =	$2,000
Hot oiler (equip, labor & mileage)		hrs @		per hour =	
Welder (equip, labor & mileage)		hrs @		per hour =	
Packer Fluid per specs		bbl @		per bbl =	
Hydraulic Jacks		hrs @		per hour =	
Bridge Plug				=	
Waste Disposal Costs				=	
Tool Rental (Describe; examples: Casing Ripper, Collar Buster, etc.)					
Tool 1				=	
Tool 2				=	
Tool 3				=	

6. Remediation Costs (mostly applicable to shallow wells)

Sample Analysis (fluid or soil)	=	
Soil Removal	=	
Site Assessment Study Costs	=	
System Removal Costs (Trucking & Siite Supervision)	=	$2,000
Disposal System Modification Costs (Cement Set Up)	=	$2,500
Installation of Monitoring Well Costs	=	
# Wells:		
Type:		
Depth:		
Construction:		

SUBTOTAL:		=	$44,800
Contingency:	10.0 %	=	$4,480
INITIAL TOTAL		=	$49,280
Inflation factor		=	1.02
TOTAL AMOUNT, Rounded to $100		=	**$50,000**

OMB No. 2040-0042 Approval Expires 11/30/2014

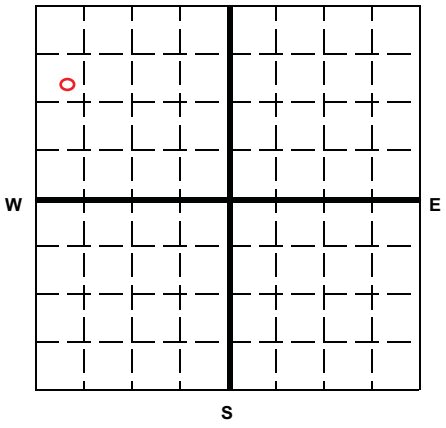
United States Environmental Protection Agency
Washington, DC 20460

PLUGGING AND ABANDONMENT PLAN

Name and Address of Facility
Michigan Potash Cluster 1

Name and Address of Owner/Operator
Michigan Potash Operating, LLC c/o Fox Rothschild
1225 17th Street, Suite 2200, Denver, CO 80215

Locate Well and Outline Unit on Section Plat - 640 Acres



State	County	Permit Number
Michigan	Osceola & Mecosta	

Surface Location Description
se 1/4 of sw 1/4 of nw 1/4 of nw 1/4 of Section 31 Township 17 Range 8

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface Location ___ ft. frm (N/S) N Line of quarter section
and ___ ft. from (E/W) W Line of quarter section.

TYPE OF AUTHORIZATION
- ☐ Individual Permit
- ☑ Area Permit
- ☐ Rule

Number of Wells 8

WELL ACTIVITY
- ☐ CLASS I
- ☐ CLASS II
  - ☐ Brine Disposal
  - ☐ Enhanced Recovery
  - ☐ Hydrocarbon Storage
- ☑ CLASS III

Lease Name: Michigan Potash
Well Number:

CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE
7	23	0	8600	8 3/4

METHOD OF EMPLACEMENT OF CEMENT PLUGS
- ☐ The Balance Method
- ☐ The Dump Bailer Method
- ☐ The Two-Plug Method
- ☑ Other

CEMENTING TO PLUG AND ABANDON DATA:	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inche	7"	7"					
Depth to Bottom of Tubing or Drill Pipe (ft							
Sacks of Cement To Be Used (each plug)	100	1220					
Slurry Volume To Be Pumped (cu. ft.)	121	1780					
Calculated Top of Plug (ft.)	8050	0					
Measured Top of Plug (if tagged ft.)							
Slurry Wt. (Lb./Gal.)	14.2	14.2					
Type Cement or Other Material (Class III)	A	A					

LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (if any)

From	To	From	To
Cement Retainer at 8,050'			
Perf 8400-8550 GROSS MD	8400	8550	

Estimated Cost to Plug Wells
$ 50,000 Per Well

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibliity of fine and imprisonment. (Ref. 40 CFR 144.32)

Name and Official Title *(Please type or print)*	Signature	Date Signed
Theodore A. Pagano, P.E., P.G., General Manager		04/02/2015

EPA Form 7520-14 (Rev. 12-11)

Q.2 Signed estimate of plugging and abandonment costs (and post-closure costs, if applicable) by an independent firm

See the following signed third party estimate, as prepared by Magna Energy Services, which matches the EPA estimate form as per Section Q.1.

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CONTINUED ON NEXT PAGE

Ted Pagano

Plug and Abandonment Proposal

P&A proposal for Osceola Michigan Injection Well

Prepared for: Ted Pagano

Date: 3/25/15
Version: #1

Submitted by:
Dave Rebol
Magna Energy Services, LLC
23295 US HWY 85
LaSalle, Colorado 80645
(970) 867-9007

Magna appreciates the opportunity to present this proposal and looks forward to being of service to you.

Foreword

Enclosed is our recommended procedure for the plug and abandonment project. The information in this proposal includes site data, calculations, materials requirements, and cost estimates. This proposal is based on information from our field personnel and previous services performed in the area.

Magna Energy Services recognizes the importance of meeting society's needs for health, safety, and protection of the environment. It is our intention to proactively work with employees, customers, the public, governments, and others to use natural resources in an environmentally sound manner while protecting health, safety, and environmental processes while supplying high quality products and services to our customers.

We appreciate the opportunity to present this proposal for your consideration and we look forward to being of service to you. Our Services for your well will be coordinated through the Magna location listed below. If you require any additional information or additional services, please feel free to contact me.

Cost Estimate ***Plug and Abandonment***

Mr. Ted Pagano
Michigan Potash Operating

P&A bid for a proposed injection well in
Osceola County, Michigan

Mr. Pagano,

Magna Energy Services will plug and abandon the above well, per the procedure provided, for the following:

Injection Well **$ 50,000**

This bid includes:

- 1,400 sacks of 13.0# class A Lite
- 7" CICR at 7,300' or 8,050'

This bid does not include:

- Hot Oiling, "Catting" in equipment, Removal of tank batteries
- Disposal of fluids
- Combating water flows
- Dirt work beyond filling in the wellhead
- Any required roadwork/repair required to allow access and egress before/after P&A
- Outside services and fresh water charged at going rates

If down hole problems are encountered (hunting casing leaks, cannot get plugs to setting depths, extra squeezes, need to fish, stuck packers, etc.) and/or the State or BLM changes the procedure on location, extra rig time is charged at going service rates.

We appreciate the opportunity to compete for your work and we look forward to hearing from you soon.

Thank you,

Dave Rebol

Class II Injection Well Proposed Procedure

Surface Casing: 13 3/8" @ 800' TOC at Surface
Intermediate Casing: 9 5/8" @ 5,500' TOC at Surface
Long String: 7" 23# @ 7,850' TOC at Surface

Prior to Move in well servicing rig check rig anchors, and determine if the well needs to be killed. If it does, make arrangements for kill fluids.

MIRU
Nipple down wellhead
Nipple up BOP
Kill well if necessary
Release packer and Pull out of the hole with OH
Set CICR at 7,300'
Pressure test tubing
Pump 100 sxs of cement under
Sting out and circulate the well with produced water
Circulate cement to surface (1400 sxs), cement should be circulated in 300 sxs at a time to avoid cementing the tubing in.
POH
Top off well with cement
Cut off wellhead and weld a plate
Nipple down BOP
RDMO
Backfill the hole

Equipment and Services List *Plug and Abandonment*

- Mobilization and demobilization of all equipment
- Well Servicing Rig and Crew
- 7-1/16” X 5000# BOP
  Note: Includes accumulator, pipe/blind rams, and rubber goods
- Hoses, lines, and connections to rig up all equipment
- Triplex pump
- Cementing equipment
- 80 bbl. water truck
- Wireline unit
- Backhoe with trailer
- Welder
- Casing Handling Equipment
- Setting and testing anchors
- A 2 3/8” N80 work string is available for $.40/ft plus trucking

Conditions

NOTE

The cost in this analysis is good for the materials and/or services outlined within. These prices are based on Magna being awarded the work on a first call basis. Prices will be reviewed for adjustments if awarded on 2nd or 3rd call basis and/or after 30 days of this written analysis. This is in an effort to schedule our work and maintain a high quality of performance for our customers.

The unit prices stated in this proposal are based on current published prices. The projected equipment, personnel, and material needs are only estimates based on the information about the work presently available to us. At the time the work is actually performed, conditions then existing may require an increase or decrease in the equipment, personnel, and/or material needs. Charges will be based upon unit prices in effect at the time the work is performed and the amount of equipment, personnel, and/or material actually utilized in the work. Taxes, if any, are not included. Applicable taxes, if any, will be added to the actual invoice.

It is understood and agreed between the parties that the exception of the subject discounts, all services performed and equipment and materials sold are provided subject to Magna's General Terms and Conditions (which include LIMITATION OF LIABILITY and WARRANTY provisions), and pursuant to the applicable Magna Work Order Contract (whether or not executed by you), unless a Master Service and/or Sales Contract applicable to the services, equipment, or materials supplied exists between your company and Magna, in which case the negotiated Master Contract shall govern the relationship between the parties. A copy of the latest version of our General Terms and Conditions is available from your Magna representative, and we would appreciate receiving any questions you may have about them. Should your company be interested in negotiating a Master Contract with Magna, our legal department team would be pleased to work with you to finalize a mutually agreeable contract. In this connection, it is also understood and agreed that Customer will continue to execute Magna field work orders and/or tickets customarily required by Magna in connection with the furnishing of said services, equipment, and materials.

Any terms and conditions contained in purchase orders or other documents issued by the customer shall be of no effect except to confirm the type and quantity of services, equipment, and materials to be supplied by the customer.

If customer does not have an approved open account with Magna or a mutually executed written contract with Magna, which dictates payment terms different than those set forth in this clause, all sums due are payable in cash at the time of performance of services or delivery of equipment, products or materials. If customer has an approved open account, invoices are payable on the twentieth day after date of invoice.

Customer agrees to pay interest on any unpaid balance from the date payable until paid at the highest lawful contract rate applicable, but never to exceed 18% per annum. In the event Magna employs an attorney for collection of any account, customer agrees to pay attorney fees of 20% of the unpaid account, plus all collection and court costs.

Q.3 Closure plan, including plans to acquire a representative fluid sample from the first aquifer overlying the injection zone (only necessary for wells which inject restricted hazardous wastes)

Not Applicable since no restricted hazardous will be injected; only water and non hazardous salt water (brine) associated with food grade salt and potash processing.

Q.4 Post-closure plan which covers the requirements of 40 CFR 146.72 (only necessary for hazardous waste wells)

Not Applicable since no restricted hazardous will be injected; only water non hazardous salt water (brine) associated with food grade salt and potash processing.

US EPA UIC PERMIT APPLICATION FORM 7520-6

Sodium and Potassium

CLASS III

ATTACHMENT R: NECESSARY RESOURCES

THE UNITED STATES POTASH PROJECT
APRIL 2015

ATTACHEMENT R.
NECESSARY RESOURCES

EPA instruction, form 7520-6 (2011):
NECESSARY RESOURCES - Submit evidence such as a surety bond or financial statement to verify that the resources necessary to close, plug or abandon the well are available.

Michigan Potash Operating and US Bank have entered into a propositioned relationship to provide the establishment of a Trust, for the purpose of providing financial assurance to verify that the resources necessary to close, plug and abandon the propositioned well(s) is available.

U.S. National Association Bank is able to accept a form of trust agreement that conforms to the EPA trust form; whereby U.S. Bank also serves as Trustee for other EPA UIC assurance throughout the country. US bank has been providing trust services for more than 100 years and currently administers more than 120,000 client matters in its Corporate Trust Division with $4 trillion. U.S. Bank has a credit rating in the top categories from all of Standard & Poor's or Moody's Investor Service and Fitch Ratings. Importantly, U.S. Bank serves as trustee on more than 200 environmental protection or remediation trusts. The bank is involved in environmental trusts involving multiple beneficiaries including EPA and state environmental protection agencies.

The Trust will be funded, as per Section 3.0 of the EPA Trust Agreement prior to the commencement of any operations or the drilling of any of the propositioned wellbores.

CFR 40.D Ch 144.63 specifically pertains to Class I hazardous wells; but is a thorough and comprehensive written guidance on underground injection control financial assurance. It is proposed then, that those requirements, as per CFR 40 Subpart F although this application is specifically for Class I. CFR 40 Ch 144.63(a)(i) requires Trust funding prior to the injection of fluids. The Trust Fund will be funded in whole prior to drilling operations commence; whereby CFR 40.D Ch 144.63(3)(a)(i), allows funding in part over the life of the well(s).

Further, as per CFR 40.D Ch 144.65(a), all the proposed wells occur in the State of Michigan, whereby, the State has dual jurisdiction via the Michigan Department of Environmental Quality, "MDEQ," who requires their own plugging and abandonment assurance before the issuance of a permit; thereby enabling the EPA regional administrator to consider, not only the above described Trust, but also the MDEQ Surety P&A Bond required before drilling commences.

The third party plug and abandonment estimate is for $ 50,000 per directional type injection well, and can be found in section Q.2.

As the required funding and assurance needs increase to adequately provide plug and abandonment assurance for each of the propositioned wellbores, the Trust funds will be increased as per the Trust Agreement.

U.S. Bank Customer Confidential

Schedule of Fees for Services as Grantor Trustee For Michigan Potash Co, LLC

CTS01010A	**Acceptance Fee** The acceptance fee includes the administrative review of documents, initial set-up of the account, and other reasonably required services up to and including the closing. This is a one-time, non-refundable fee, payable at closing.
CTS04200	**Trustee** Annual fee for the standard trustee services associated with the administration of the account. Administration fees are payable in advance.
	Direct Out of Pocket Expenses Reimbursement of expenses associated with the performance of our duties, including but not limited to publications, legal counsel after the initial close, travel expenses and filing fees.
	Extraordinary Services Extraordinary Services are duties or responsibilities of an unusual nature, including termination, but not provided for in the governing documents or otherwise set forth in this schedule. A reasonable charge will be assessed based on the nature of the services and the responsibility involved. At our option, these charges will be billed at a flat fee or at our hourly rate then in effect.

Account approval is subject to review and qualification. Fees are subject to change at our discretion and upon written notice. Fees paid in advance will not be prorated. The fees set forth above and any subsequent modifications thereof are part of your agreement. Finalization of the transaction constitutes agreement to the above fee schedule, including agreement to any subsequent changes upon proper written notice. In the event your transaction is not finalized, any related out-of-pocket expenses will be billed to you directly. Absent your written instructions to sweep or otherwise invest, all sums in your account will remain uninvested and no accrued interest or other compensation will be credited to the account. Payment of fees constitutes acceptance of the terms and conditions set forth.

IMPORTANT INFORMATION ABOUT PROCEDURES FOR OPENING A NEW ACCOUNT:
To help the government fight the funding of terrorism and money laundering activities, Federal law requires all financial institutions to obtain, verify and record information that identifies each person who opens an account.
For a non-individual person such as a business entity, a charity, a Trust or other legal entity we will ask for documentation to verify its formation and existence as a legal entity. We may also ask to see financial statements, licenses, identification and authorization documents from individuals claiming authority to represent the entity or other relevant documentation.

Dated: October 2, 2014

TRUST AGREEMENT

U.S. ENVIRONMENTAL PROTECTION AGENCY
UNDERGROUND INJECTION CONTROL PROGRAM
FINANCIAL RESPONSIBILITY REQUIREMENT

To: U.S. Environmental Protection Agency, Region 5
77 W. Jackson Blvd.
Chicago, IL 60604

TRUST AGREEMENT, the "Agreement", entered into as of _____
(date)
by and between Michigan Potash Operating,
(name of owner or operator)
a Colorado Limited Liability Company, the "Grantor",
(name of state) (corporation, partnership, association, or proprietorship)

and U.S. National Association Bank, ( ) incorporated in the
(name of corporate trustee)

State of _____ Or (X) a national bank, the "Trustee".

WHEREAS, the United States Environmental Protection Agency, "EPA," an agency of the United States Government, has established certain regulations applicable to the Grantor, requiring that an owner or operator of an injection well shall provide assurance that funds will be available when needed for plugging and abandonment of the injection well(s),

WHEREAS, the Grantor has elected to establish a trust to provide all or part of such financial assurance for the facility or facilities identified herein, and

WHEREAS, the Grantor, acting through its duly authorized officers has selected the Trustee to be the trustee under this Agreement, and the Trustee is willing to act as trustee,

NOW THEREFORE, the Grantor and Trustee agree as follows:

Section 1. Definitions. As used in this agreement:

(a) The term "Grantor" means the owner or operator who enters into this Agreement and any successors or assigns of the Grantor.

(b) The term "Trustee" means the Trustee who enters into this Agreement and any successor Trustee.

(c) Facility or activity means any "underground injection well" or any other facility or activity that is subject to regulation under the Underground Injection Control Program.

Section 2. Identification or Facilities and Cost Estimates. This Agreement pertains to the facilities and cost estimates identified on attached Schedule A (attached). (Schedule A lists, for each facility, the EPA identification number, name, address, and the current plugging and abandonment cost estimate, or portions thereof, for which financial assurance is demonstrated.)

Section 3. Establishment of Fund. The Grantor and the Trustee hereby establish a trust fund, the "Fund," for the purpose of assuring compliance with the plugging and abandonment requirements established by EPA for the facilities identified on Schedule A. The Underground Injection Control regulations which govern the authorization to inject include a requirement for such financial assurance that the well or wells shall be plugged and abandoned at the time designated by EPA. The Grantor and Trustee acknowledge that the Fund and all expenditures from the Fund shall be to fulfill the legal obligations of the Grantor under such regulations, and not any obligation of EPA. The Grantor and the Trustee intend that no third party have access to the Fund except as herein provided. The Fund is established initially as consisting of the property, which is acceptable to the Trustee, described in Schedule B attached hereto. Such property and any other property subsequently transferred to the Trustee is referred to as the Fund, together with all earnings and profits thereon, less any payments or distributions made by the Trustee pursuant to this Agreement. The Fund shall be held by the Trustee, IN TRUST, as hereinafter provided. The Trustee shall not be responsible, nor shall it undertake any responsibility, for the amount or adequacy of any additional payments necessary to discharge any liabilities of the Grantor established by EPA, nor shall the Trustee have any duty to collect such additional amounts from the Grantor.

Section 4. Payment for Plugging and Abandonment. The Trustee shall make payments from the Fund only for the costs of plugging and abandonment ("P&A") of the injection wells covered by this Agreement and the associated P&A Plan, only after EPA has advised the Trustee that work has been completed under the P&A Plan that complies with 40 C.F.R. § 144.28 and/or § 144.52. The Trustee shall not refund to the Grantor any amounts from the Fund unless and until EPA has advised the Trustee that the P&A Plan has been successfully completed. The Trustee shall not release any funds to the Grantor that are necessary to cover liability for any injection wells covered by this Agreement that remain unplugged.

Section 5. Payments Comprising the Fund. Payments made to the Trustee for the Fund shall consist of cash or securities acceptable to the Trustee.

Section 6. Trustee Management. The Trustee shall invest and reinvest the principal and income of the Fund and keep the Fund invested as a single fund, without distinction between principal and income, in accordance with general investment policies and guidelines which the Grantor may communicate in writing to the Trustee from time to time, subject, however, to the provisions of this Section. In investing, reinvesting, exchanging, selling, and managing the Fund, the Trustee shall discharge his duties with respect to the trust fund solely in the interest of the beneficiary and with the care, skill, prudence, and diligence under the circumstances then prevailing which persons of prudence, acting in a like capacity and familiar with such matters, would use in the conduct of an enterprise of a like character and with like aims; *except that:*

(i) Securities or other obligations of the Grantor, or any other owner or operator of the facilities, or any of their affiliates as defined in the Investment Company Act of 1940, as amended, 15 U.S.C. 80a-2.(a), shall not be acquired or held, unless they are securities or other obligations of the Federal or a State government;

(ii) The Trustee is authorized to invest the Fund in time or demand deposits of the Trustee, to the extent insured by an agency of the Federal or State government; and

(iii) The Trustee is authorized to hold cash awaiting investment or distribution uninvested for a reasonable time and without liability for the payment of interest thereon.

Section 7. Commingling and Investment. The Trustee is expressly authorized in its discretion: (a) To transfer from time to time any or all of the assets of the Fund to any common, commingled, or collective trust fund created by the Trustee in which the Fund is eligible to participate, subject to all of the provisions thereof, to be commingled with the assets of other trusts participating therein; and (b) To purchase shares in any investment company registered under the Investment Company Act of 1940, 15 U.S.C. 80a-1 *et seq*., including one which may be created, managed, underwritten, or to which investment advice is rendered or the shares of which are sold by the Trustee. The Trustee may vote shares in its discretion.

Section 8. Express Powers of Trustee. Without in any way limiting the powers and discretions conferred upon the Trustee by the other provisions of this Agreement or by law, the Trustee is expressly authorized and empowered: (a) To sell, exchange, convey, transfer, or otherwise dispose of any property held by it, by public or private sale. No person dealing with the Trustee shall be bound to see to the application of the purchase money or to inquire into the validity or expediency of any such sale or other disposition; (b) To make, execute, acknowledge, and deliver any and all documents of transfer and conveyance and any and all other instruments that may be necessary or appropriate to carry out the powers herein granted; (c) To register any securities held in the Fund in its own name or in the name of a nominee and to hold any security in bearer form or in book entry, or to combine certificates representing such securities with certificates of the same issue held by the Trustee in other fiduciary capacities, or to deposit or arrange for the deposit of such securities in a qualified central depository even though, when so deposited, such securities may be merged and held in bulk in the name of the nominee of such depositary with other securities deposited therein by another person, or to deposit or arrange for the deposit of any securities issued by the United States Government, or any agency or instrumentality thereof, with a Federal Reserve Bank, but the books and records of the Trustee shall at all times show that all such securities are part of the Fund; (d) To deposit any cash in the Fund in interest-bearing accounts maintained or savings certificates issued by the Trustee, in its separate corporate capacity, or in any other banking institution affiliated with the Trustee, to the extent insured by an agency of the Federal or State government; and (e) To compromise or otherwise adjust all claims in favor of or against the Fund.

Section 9. Taxes and Expenses. All taxes of any kind that may be assessed or levied against or in respect of the Fund and all brokerage commissions incurred by the Fund shall be paid from the Fund. All other expenses incurred by the Trustee in connection with the administration of this Trust, including fees for legal services rendered to the Trustee, the compensation of the Trustee to the extent not paid directly by the Grantor, and all other proper charges and disbursements of the Trustee shall be paid from the Fund.

Section 10. Annual Valuation. The Trustee shall annually, at least 30 days prior to the anniversary date of establishment of the Fund, furnish to the Grantor and to the appropriate EPA Regional Administrator a statement confirming the value of the Trust. Any securities in the Fund shall be valued at market value as of no more than 60 days prior to the anniversary date of establishment of the Fund. The failure of the Grantor to object in writing to the Trustee within 90 days after the statement has been furnished to the Grantor and the EPA Regional Administrator shall constitute a conclusively binding assent by the Grantor, barring the Grantor from asserting any claim or liability against the Trustee with respect to matters disclosed in the statement.

Section 11 Advice of Counsel. The Trustee may from time to time consult with counsel, who may be counsel to the Grantor, with respect to any question arising as to the construction of this Agreement of any action to be taken hereunder. The Trustee shall be fully protected, to the extent permitted by law, in acting upon the advice of counsel.

Section 12. Trustee Compensation. The Trustee shall be entitled to reasonable compensation for its services as agreed upon in writing from time to time with the Grantor.

Section 13. Successor Trustee. The Trustee may resign or the Grantor may replace the Trustee, but such resignation or replacement shall not be effective until the Grantor has appointed a successor trustee and this successor accepts the appointment. The successor trustee shall have the same powers and duties as those conferred upon the Trustee hereunder. Upon the successor trustee's acceptance of the appointment, the Trustee shall assign, transfer, and pay over to the successor trustee the funds and properties then constituting the Fund. If for any reason the Grantor cannot or does not act in the event of the resignation of the Trustee, the Trustee may apply to a court of competent jurisdiction for the appointment of a successor trustee or for instructions. The successor trustee shall specify the date on which it assumes administration of the trust in a writing sent to the Grantor, the EPA Regional Administrator, and the present Trustee by certified mail 10 days before such changes become effective. Any expenses incurred by the Trustee as a result of any of the acts contemplated by this Section shall be paid as provided in Section 9.

Section 14. Instructions to the Trustee. All orders, requests, and instructions by the Grantor to the Trustee shall be in writing, signed by such persons as are designated in the attached Exhibit A or such other designees as the Grantor may designate by amendment to Exhibit A. The Trustee shall be fully protected in acting without inquiry in accordance with the Grantor's orders, requests, and instructions. All orders, requests, and instructions by the EPA Regional Administrator to the Trustee shall be in writing, signed by the EPA Regional Administrators of the Regions in which the facilities are located, or their designees, and the Trustee shall act and shall be fully protected in acting in accordance with such orders, requests, and instructions. The Trustee shall have the right to assume, in the absence of written notice to the contrary, that no event constituting a change or a termination of the authority of any person to act on behalf of the Grantor or EPA hereunder has occurred. The Trustee shall have no duty to act in the absence of such orders, requests, and instructions from the Grantor and/or EPA, except as provided for herein.

Section 15. Notice of Nonpayment. The Trustee shall notify the Grantor and the appropriate EPA Regional Administrator, by certified mail within 10 days following the expiration of the 30-day period after the anniversary of the establishment of the Trust, if no payment is received from the Grantor during that period. After the pay-in period is completed, the Trustee shall not be required to send a notice of nonpayment.

Section 16. Amendment of Agreement. This Agreement may be amended by an instrument in writing executed by the Grantor, the Trustee, and the appropriate EPA Regional Administrator, or by the Trustee and the appropriate EPA Regional Administrator if the Grantor ceases to exist.

Section 17. Irrevocability and Termination. Subject to the right of the parties to amend this Agreement as provided in Section 16, this Trust shall be irrevocable and shall continue until terminated at the written agreement of the Grantor, the Trustee, and the EPA Regional Administrator, or by the Trustee and the EPA Regional Administrator if the Grantor ceases to exist. Upon termination of the Trust, all remaining trust property, less final trust administration expenses, shall be delivered to the Grantor.

Section 18. Immunity and Indemnification. The Trustee shall not incur personal liability of any nature in connection with any act or omission, made in good faith, in the administration of this

Trust, or in carrying out any directions by the Grantor or the EPA Regional Administrator issued in accordance with this Agreement. The Trustee shall be indemnified and saved harmless by the Grantor or from the Trust Fund, or both, from and against any personal liability to which the Trustee may be subjected by reason of any act or conduct in its official capacity, including all expenses reasonably incurred in its defense in the event the Grantor fails to prove such defense.

Section 19. Choice of Law. This agreement shall be administered, construed, and enforced according to the laws of the State of Colorado.

Section 20. Interpretation. As used in this Agreement, words in the singular include the plural and words in the plural include the singular. The descriptive headings for each Section of the Agreement shall not affect the interpretation or the legal efficacy of this Agreement.

IN WITNESS WHEREOF the parties have caused this Agreement to be executed by their respective representatives duly authorized and their seals to be hereunto affixed and attested as of the date first above written.

GRANTOR

_____

By: __Theodore A. Pagano_____

[Print name]

Its: __General Manager_____

[Title]

Attest:

_____

Its: _____

[Title]

[SEAL]

Before me came the individual whose identity I confirmed as _____, and whose true signature is set forth above; wherefor have I set my hand and and seal this ___day of _____, 200__.

_____

Notary Public

TRUSTEE

_____

By:_____

[Print name]

Its:_____

[Title]

Attest:

_____

Its:_____

[Title]

[SEAL]

Before me came the individual whose identity I confirmed as _____, and whose true signature is set forth above; wherefor have I set my hand and and seal this ___day of _____, 200__.

_____

Notary Public

SCHEDULE A

Identification of Facilities and Cost Estimates

(Schedule A lists, for each facility, the EPA identification number, name, address, and the current plugging and abandonment cost estimate, or portions thereof, for which financial assurance is demonstrated.)

Schedule A is referenced in the Trust Agreement dated _____ by and

between _____Michigan Potash Operating, LLC_____, the "Grantor" and
(name of owner or operator)

U.S. National Association Bank (name of the trustee)

EPA Identification Number	Name of Well	Address (Lat-Long)	Third Party Estimate to Plug and Abandon (Date of Estimate)	Financial Assurance to be Demonstrated as Per CFR 40.D Ch 144.63(3)(a)(i)	When as Per CFR 40.D Ch 144.63(3)(a)(i)
TBD	Michigan Potash Cluster 1	49-43-33.4052 85-19-23.3748	$ 50,400 per well 8 wells initially	$ 50,400	At Drilling and Before Injection

SCHEDULE B

Description of Property / Financial Instrument

[Surety, Letter of Credit, etc.]

Schedule B is referenced in the Standby Trust Agreement (Section 3) dated _____

by and between Michigan Potash Operating, LLC , the "Grantor,"
(name of owner or operator)

and U.S. National Association Bank ___ , the "Trustee."
(name of the trustee)

Description of Property / Financial Instrument:

1. ___Cash or Letter of Credit, at time of drilling

   _____

   _____

   _____

2. _____

   _____

   _____

US EPA UIC PERMIT APPLICATION FORM 7520-6

Sodium and Potassium

CLASS III

ATTACHMENT S: AQUIFER EXCEPTIONS

THE UNITED STATES POTASH PROJECT
APRIL 2015

US EPA UIC PERMIT APPLICATION FORM 7520-6

Sodium and Potassium

CLASS III

ATTACHMENT T: EXISTING EPA PERMITS

ATTACHEMENT T.
EXISTING EPA PERMITS

EXISTING EPA PERMITS - List program and permit number of any existing EPA permits, for example, NPDES, PSD, RCRA, etc.

T.1 Briefly describe activities which require the applicant to contain permits under the RCRA, UIC, NPDES, or PSD programs. List all permits or construction approvals received or applied for at the facility where the well is located, under any of the following programs:

1) Hazardous Waste Management under RCRA

None.

2) UIC program under SDWA

Michigan Potash Operating is simultaneously applying for an Area non-hazardous Class I injection permit to dispose of non-hazardous brine and salt water produced from the Class III operation. Portions of the information and EPA checklist items are duplicitous provided the same AOR; to application numbers:

Class I Non Hazardous MI-133-1I-0004, MI-133-1I-0005 and MI-133-1I-0006, submitted January 16, 2015 by Michigan Potash Operating.

As referenced in the application, independent from the applicant, just outside of the AOR are Injection permits MI-133-1I-0001 and MI-133-1I-0002, MIA-133-3G-0002

3) NPDES program under CWA

None.

4) PSD program under CAA

None.

5) Non-attainment program under CAA

None.

6) Dredge and fill permits under Section 404 of CWA

None.

7) Other relevant environmental permits, including State permits

The applicant does not have any other permit applications associated with Class III injection.

US EPA UIC PERMIT APPLICATION FORM 7520-6

Sodium and Potassium

CLASS III

ATTACHMENT U: DESCRIPTION OF BUSINESS

THE UNITED STATES POTASH PROJECT
APRIL 2015

ATTACHEMENT U.
DESCRIPTION OF BUSINESS

DESCRIPTION OF BUSINESS - Give a brief description of the nature of the business.

Michigan Potash Operating's sole business purpose is to intelligibly and carefully handle salt water that is created from the manufacturing of natural agricultural fertilizer that U.S. farmers must have to grow our food.

There are only 12 companies in the world that produce muriate of potash, a natural fertilizer supplement that provides potassium to all living things. Only one remains in the United States, and the U.S. is 86% import reliant, making potash the highest cost fertilizer to our farmers.

Sodium and Potassium

CLASS III

STATE HISTORIC PRESERVATION OFFICE
Application for Review
Drilling Pad 1
NW/4 NW/4 Section 31, Evart Township, Michigan

THE UNITED STATES POTASH PROJECT
APRIL 2015

ATWELL

March 30, 2015

Mr. Brian Conway
State Historic Preservation Office
Environmental Review Office
Michigan Historical Center
702 W. Kalamazoo Street, P.O. Box 30740
Lansing, MI 48909-8240

RE: Section 106 Review Request
New Well Pad
Well Name: MPC DD Pad#1
T17N, R08W, Sec. 31, NW¼, NW¼
Evart Township, Osceola County

Dear Mr. Conway,

Michigan Potash Company is proposing to construct a well drilling pad for the purposes of drilling multiple underground injection wells and solution mining wells. In order to apply for a Class I or Class III United States Environmental Protection Agency (USEPA) permit, the USEPA regulations require a determination that the project will not impact any properties listed or eligible for listing in the National Register of Historic Places. Enclosed, please find a completed Section 106 review application pertaining to the proposed well pad along with the required attachments. For your reference, the subject pad is the same pad previously reviewed by your office in connection with the MPC-1D & MPC-2D well applications (ER14-141). Please feel free to contact our office if you should have any questions.

We request that you make your reply directly to:

USEPA
Region 5
77 W. Jackson Bld. WU 16J
Chicago, IL 60604

With a copy to: Atwell
Attn. J. Dean Geers
7192 E. 34 Road, Suite 4
Cadillac, MI 49601

We wish to thank you in advance for your timely review of this matter.

Respectfully,
ATWELL

J. Dean Geers, P.S. Project Manager

Enclosures

cc: Atwell File 14001984.01

STATE HISTORIC PRESERVATION OFFICE
Application for Section 106 Review

SHPO Use Only

☐ IN Received Date ____ / ____ / ____ Log In Date ____ / ____ / ____

☐ OUT Response Date ____ / ____ / ____ Log Out Date ____ / ____ / ____

Sent Date ____ / ____ / ____

Submit one copy for each project for which review is requested. This application is required. Please type. Applications must be complete for review to begin. Incomplete applications will be sent back to the applicant without comment. Send only the information and attachments requested on this application. Materials submitted for review cannot be returned. Due to limited resources we are unable to accept this application electronically.

I. GENERAL INFORMATION

☒ THIS IS A NEW SUBMITTAL ☐ THIS IS MORE INFORMATION RELATING TO ER#

- ☐ Funding Notice
- ☐ Survey
- ☐ MOA or PA
- ☒ Other: Directional Drilling Pad

a. Project Name: MPC DD Pad#1
b. Project Address (if available): N/A-Project lies in the NW 1/4, NW 1/4 of Section 31, T17N, R08W
c. Municipal Unit: Evart Twp. County: Osceola Co
d. Federal Agency and Contact (*If you do not know the federal agency involved in your project please contact the party requiring you to apply for Section 106 review, not the SHPO, for this information.*): USEPA Region 5
e. State Agency and Contact (if applicable): MDEQ Cadillac Office
f. Consultant or Applicant Contact Information (if applicable): Michigan Potash Company

---

II. GROUND DISTURBING ACTIVITY (INCLUDING EXCAVATION, GRADING, TREE REMOVALS, UTILITY INSTALLATION, ETC.)

DOES THIS PROJECT INVOLVE GROUND-DISTURBING ACTIVITY? ☒ YES ☐ NO (If no, proceed to section III.)

Exact project location must be submitted on a USGS Quad map (portions, photocopies of portions, and electronic USGS maps are acceptable as long as the location is clearly marked).

a. USGS Quad Map Name: Chippewa Lake North, Michigan
b. Township: 17N Range: 08W Section: 31
c. Description of width, length and depth of proposed ground disturbing activity: 410'L x 250'W x 4'D
d. Previous land use and disturbances: Cultivated Field
e. Current land use and conditions: Dormant Field
f. Does the landowner know of any archaeological resources found on the property? NO
   Please describe:

III. PROJECT WORK DESCRIPTION AND AREA OF POTENTIAL EFFECTS (APE)
Note: Every project has an APE.

a. Provide a detailed written description of the project (plans, specifications, Environmental Impact Statements (EIS), Environmental Assessments (EA), etc. **cannot** be substituted for the written description): See attached
b. Provide a localized map indicating the location of the project; road names must be included and legible.
c. On the above-mentioned map, identify the APE.
d. Provide a written description of the APE (physical, visual, auditory, and sociocultural), the steps taken to identify the APE, and the justification for the boundaries chosen. See attached

IV. IDENTIFICATION OF HISTORIC PROPERTIES

a. List and date **all** properties 50 years of age or older located in the APE. If the property is located within a National Register eligible, listed or local district it is only necessary to identify the district: There are no structures over 50 years of age within the 200' APE.
b. Describe the steps taken to identify whether or not any **historic** properties exist in the APE and include the level of effort made to carry out such steps: Site visit, check of historical registry, inquire of landowner, no known event of common knowledge
c. Based on the information contained in "b", please choose one:
   - ☐ Historic Properties Present in the APE
   - ☒ No Historic Properties Present in the APE
d. Describe the condition, previous disturbance to, and history of any historic properties located in the APE: N/A

V. PHOTOGRAPHS

Note: All photographs must be keyed to a localized map, and should be included as an attachment to this application.

a. Provide photographs of the site itself.
b. Provide photographs of all properties 50 years of age or older located in the APE (faxed or photocopied photographs are not acceptable).

VI. DETERMINATION OF EFFECT

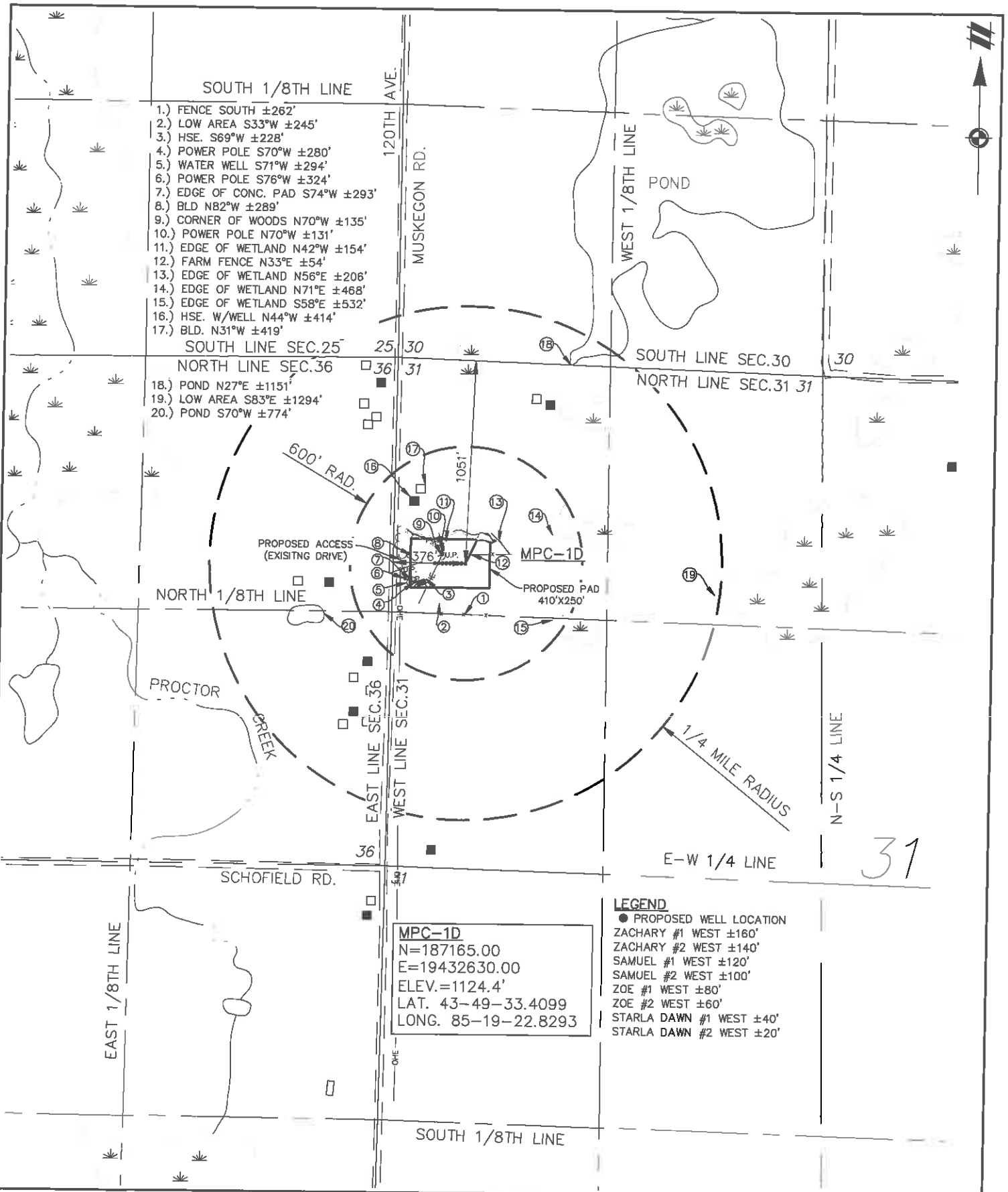
☒ No historic properties affected based on [36 CFR § 800.4(d)(1)], please provide the basis for this determination.

There is no hisstoric structures or objects, no information in the historical registry, no historical event known to take place and no other indication that historic properties lie within the physical APE.

☐ No Adverse Effect [36 CFR § 800.5(b)] on historic properties, explain why the criteria of adverse effect, 36 CFR Part 800.5(a)(1), were found not applicable.

☐ Adverse Effect [36 CFR § 800.5(d)(2)] on historic properties, explain why the criteria of adverse effect, [36 CFR Part 800.5(a)(1)], were found applicable.

Please print and mail completed form and required information to:
State Historic Preservation Office, Environmental Review Office, Michigan Historical Center, 702 W. Kalamazoo Street, P.O. Box 30740, Lansing, MI 48909-8240



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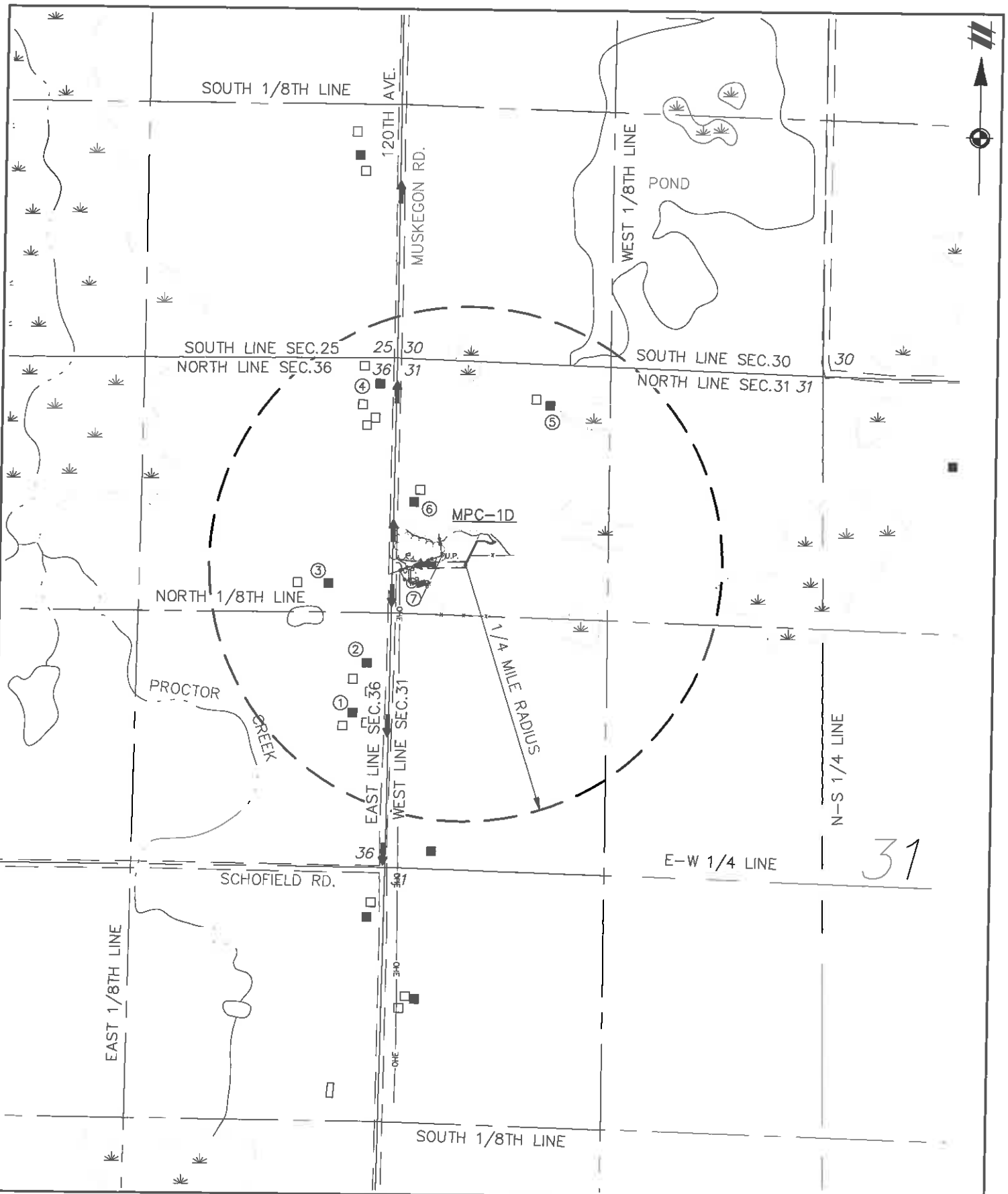
SUPPLEMENTAL PLAT: MPC-1D
SEC. 31, T17N-R8W
EVART TWP.
OSCEOLA COUNTY, MICHIGAN

DATE: 12/9/14
DRN: SJV
SCALE: 1"=660'

CLIENT: MICHIGAN POTASH COMPANY

ATWELL
866.850.4200 | www.atwell-group.com
7192 EAST 34 ROAD, SUITE 4
CADILLAC, MI 49601
231.775.3000

F.B. 1427
PAGE. 7-10
SHEET 1 OF 1
JOB NO.: 14001984.01



H2S EVACUATION: MPC 1D SEC. 31, T17N-R8W EVART TWP. OSCEOLA COUNTY, MICHIGAN	DATE: 12/19/14	ATWELL 866.850.4200 | www.atwell-group.com 7192 EAST 34 ROAD, SUITE 4 CADILLAC, MI 49601 231.775.3000		
	DRN: SJV			
CLIENT: MICHIGAN POTASH COMPANY	SCALE: 1"=660'	F.B. 1427 PAGE. 10	SHEET 1 OF 1	JOB NO.: 14001984.01

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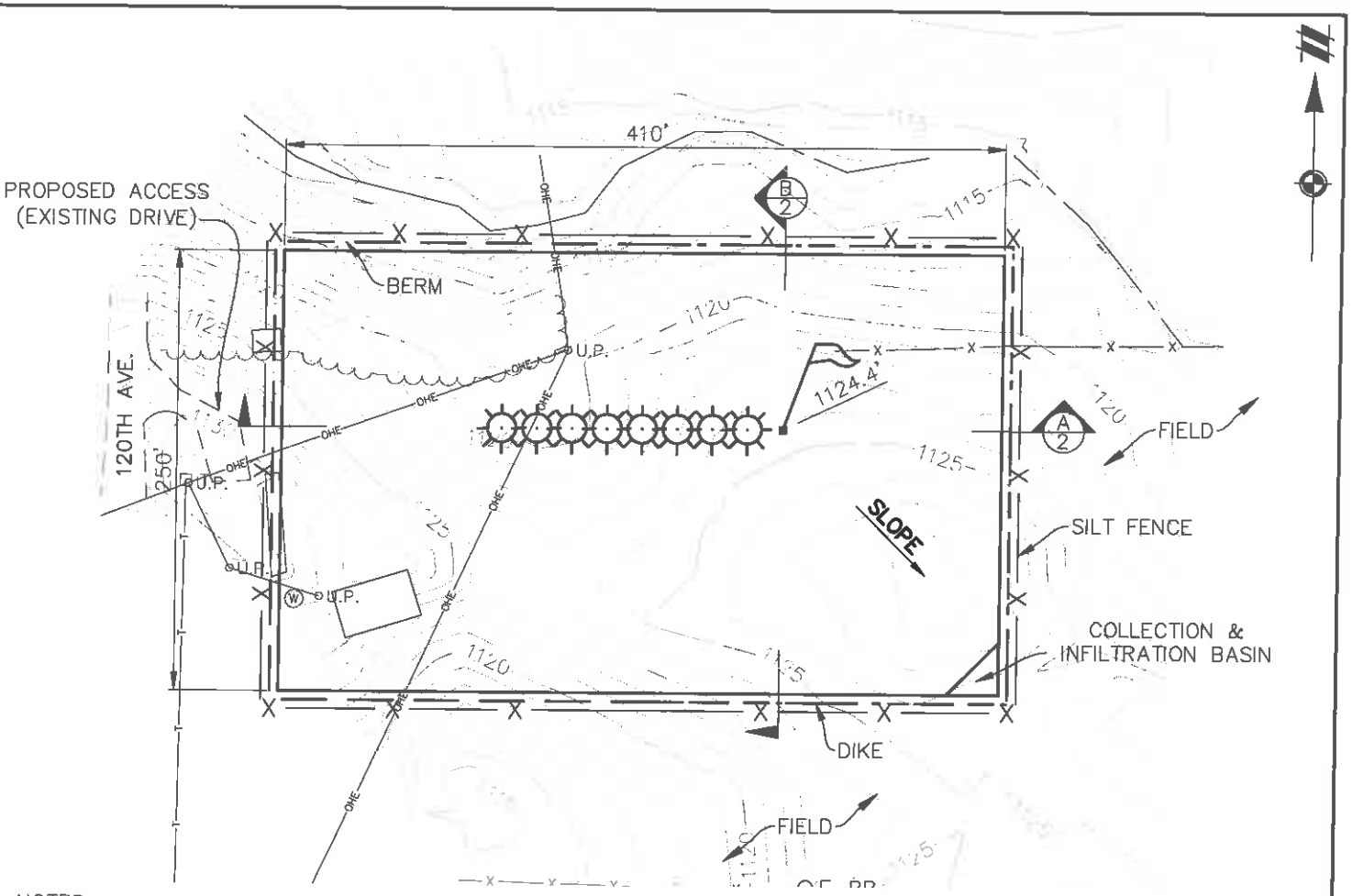

NOTES:

1.) EROSION AND SEDIMENTATION CONTROL DEVICES SHALL BE IN PLACE PRIOR TO START OF GRADING OPERATIONS.

2.) EROSION AND SEDIMENTATION CONTROL DEVICES SHALL BE CLEANED AND/OR REPLACED WHEN THEY REACH 40% CAPACITY (INCLUDING INFILTRATION BASIN).

3.) ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED PER ACT 347, P.A.1972 AS AMENDED.

4.) SET ELEVATIONS FOR WELL PAD TO MINIMIZE MASS GRADING QUANTITY (1123'±).

5.) SLOPE WELL PAD SOUTHWESTERLY AT ±2% TO MAINTAIN A WELL DRAINED WORK AREA DURING DRILLING OPERATIONS.

6.) A COLLECTION & INFILTRATION BASIN SHALL BE CONSTRUCTED AT THE SOUTHEAST CORNER OF PAD IF NEEDED.

7.) SLOPES SHALL BE FINE GRADED TO MAXIMUM SLOPE TO 2:1 TO MINIMIZE EROSION. IN ALL FILL AREAS, THE EDGES SHALL BE DIKED TO PREVENT EROSION. CUT SLOPES SHALL BE CONTOURED AND COMPACTED.

8.) AN UPSLOPE DIVERSION BERM AND DIVERSION CHANNEL SHALL BE CONSTRUCTED ALONG THE NORTH AND WEST SIDES OF THE LOCATION.

9.) ARMOR, SILT FENCING OR OTHER SOIL EROSION CONTROL MEASURES SHALL BE UTILIZED AS NEEDED.

10.) ALL DISTURBED AREAS SHALL BE SEEDED AND MULCHED FOLLOWING THE COMPLETION OF GRADING OPERATIONS, WEATHER PERMITTING.

EROSION CONTROL PLAN: MPC-1D SEC. 31, T17N-R8W EVART TWP. OSCEOLA COUNTY, MICHIGAN	DATE: 12/18/14 DRN: SJV	ATWELL 866.850.4200 | www.atwell-group.com 7192 EAST 34 ROAD, SUITE 4 CADILLAC, MI 49601 231.775.3000	Land Development & Real Estate Power & Energy Infrastructure & Transportation Environmental & Solid Waste Water & Natural Resources	
CLIENT: MICHIGAN POTASH COMPANY	SCALE: 1"=100'	F.B. 1427 PAGE. 10	SHEET 1 OF 2	JOB NO.: 14001984.01

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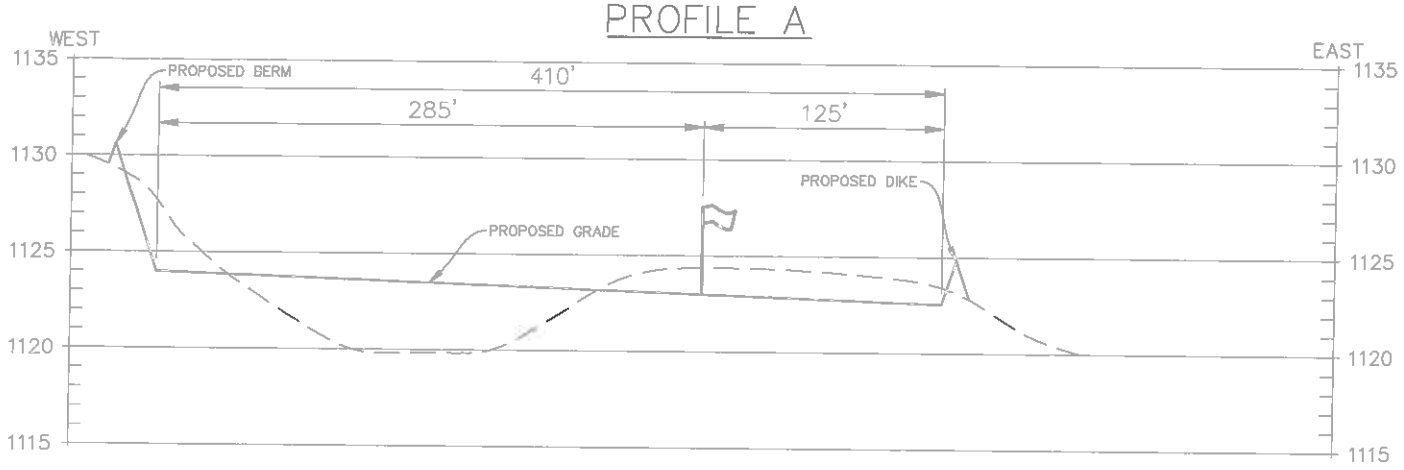
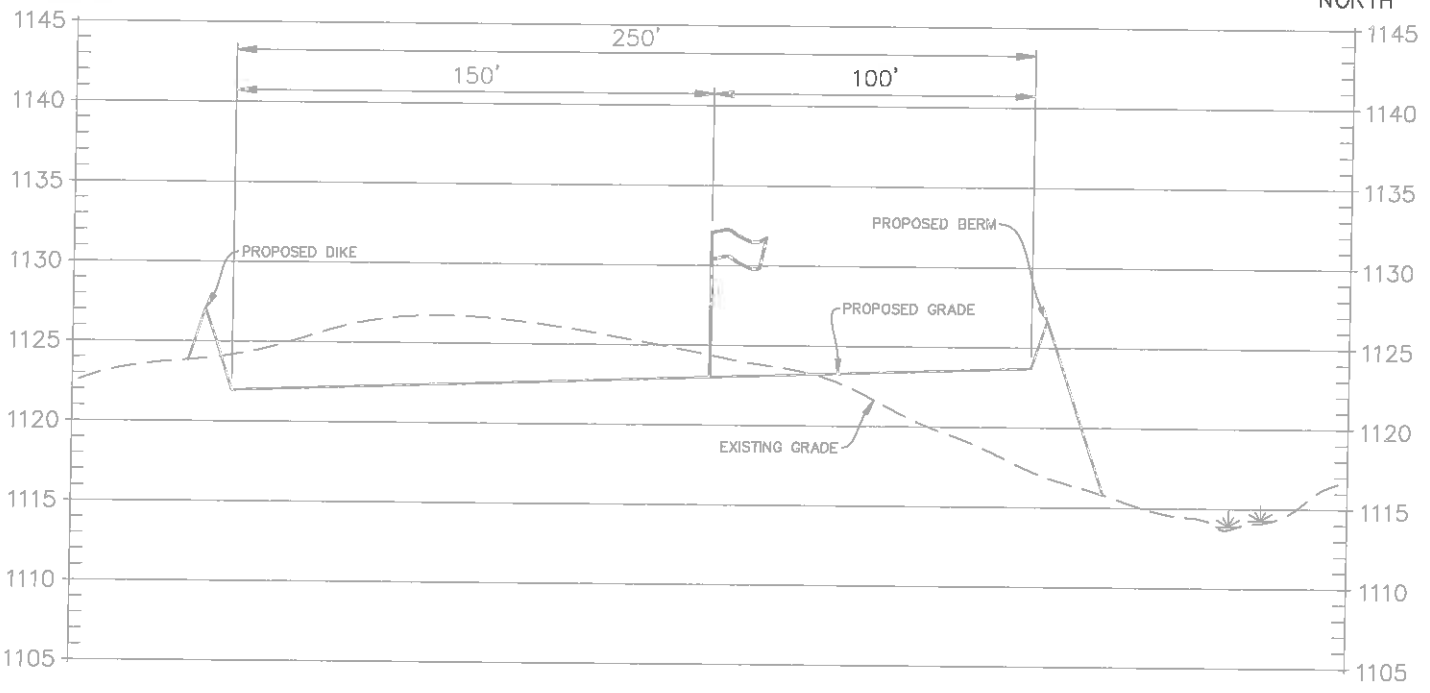
PROFILE A



SCALE:
HORIZONTAL: 1'=100
VERTICAL: 1"=10'

PROFILE B



SCALE:
HORIZONTAL: 1'=60
VERTICAL: 1"=6'

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EROSION CONTROL PLAN: MPC-1D
SEC. 31, T17N-R8W
EVART TWP.
OSCEOLA COUNTY, MICHIGAN

DATE: 12/9/14
DRN: SJV

CLIENT: MICHIGAN POTASH COMPANY

SCALE: 1"=60'

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Land Development & Real Estate
Power & Energy
Infrastructure & Transportation
Environmental & Solid Waste
Water & Natural Resources

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JOB NO.: 14001984.01